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FIFTEENTH YEAR.

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—BY—

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WHATEVER the hopes entertained by certain parties as to the possible improvement in the price of iron, we confess we do not share them. Seven weeks have now elapsed since there was an apparent weakening in prices, which was preceded two weeks previously by a falling off in the quotations for British iron. The decline in price has failed to stimulate the engineering industries of the country, including those branches concerned with machines, and a prolonged period of quietude in the iron trade is to be anticipated. The industries dependent directly or indirectly on iron are ever sensitive to its financial position, and their activity is gauged by this. The railways are such vast absorbers of iron that their demands strike the key-note in the trade, and a check to their orders is an infallible indication of a falling off in the industrial activity of the country. The decline of prices has further been aided by the encouragement in more active times that has been imparted to productive capacity; more furnaces have been put in operation than ever, and in addition to existing stock, which is, however, by no means excessive, prospective supplies exert a discounting influence. Coupled with this, the dulness which reigns in the iron trade of England, and the lowering freights, have an appreciable weight in depressing rates. At present the major portion of British exports to this country are not passing into consumption, but are only drawn on to supply current requirements of consumers.

A communication which we publish elsewhere embodies a statement of Mr. T. T. Eyre of Decatur, Col., who has spent several years in Durango, Mexico, as to the abundance of tin in that locality, the metal presenting itself in rich fissure veins, allowing of easy working. The extent of the tin fields would appear to be large. Should the estimate of Mr. Eyre that the mines can be made to produce enough to supply our market for many years to come be confirmed, they will prove an immense boon to the tin trade, hitherto dependent on London operators for prices and supplies, provided the tin can be delivered at lower rates. From 15 to 35 cents per pound, according to fineness and the care taken in preparing it for the market, is at present the price of the tin smelted at Durango, but seeing that Straits are quoted at 22@22½, it is evident that the price must be reduced to render its shipment to the States profitable, and this can be brought about by the investment of larger capital, more systematic mining and improved furnaces. Tin, owing to limited supply, has hitherto been subject to more speculation than any other metal, and a larger production besides reducing the speculative element will allow of its wider application. Before the close of the present year tin can be shipped from the Durango mines by the Mexican Central Railway, and eventually Durango will also be served by the Mexican National, these lines affording a choice of ports. The rates now offered for delivery of the ore at New York are remarkably low.

WHILST Cleveland cannot rival several other cities on the Lakes in the scale on which vessel building is carried on, our record of what has been done here in this line shows the general activity that has prevailed. Some of the most splendid craft on the lakes have been launched from this port. The advantages which Cleveland possesses in the supply of iron plates as well as other structural portions of iron vessels, favors the building of such craft. The great body of her shipwrights are second to none at the seaport towns. Not many years will elapse before a good percentage of the present wooden lake vessels will be out of service from sheer decay, and there is the probability that their place will mostly be taken by larger vessels, and these of iron. The enlargement of the Welland canal offers a new scope for shipbuilding enterprise, which will be taken advantage of in due time by our capitalists. The changes in vessel construction that have been brought about of late years are of an important character. Not only is greater strength and speed secured, but vessels are built more adapted to special descriptions of freight. More power has also been gained with a given amount of coal, so reducing the displacement by the coal carried; engines are more compact, and boilers relatively to their capacity are reduced in size and weight. There is less dead weight carried and draught relatively to measurement capacity is lessened. We have had occasion to comment on the graceful lines of many of the new vessels lauched. The time was when a lake vessel was a cumbrous affair, with no proper relation between breadth of beam and length.

THERE is a general concurrence of opinion that the bill now before the House Committee on Patents, providing for the extension of the Siemens regenerative furnace patent, should be reported against adversely. The system which recommends itself by the high and regular temperature it provides, is used in the manufacture of crucible and open hearth steel, and for improving the temper of blooms and for copper refining. The petition of the steel companies who have bought a license outright for the use of the method, sets forth various allegations in their favor, to none of which we attach weight as set against the interests of iron and glass makers throughout the country. The English patents expired in January, 1875, and foreign rivals of our own iron makers using it have an advantage over them, a royalty being demanded for its use here of $2.50 per ton. The owners of the patent have received at least $800,000, which surely is sufficient compensation. An amendment might well be introduced into the patent law by which a patent should not be in force in the United States after it expired in the foreign country where the invention it covers originated, and where it was first brought out.

THE crop prospects in all the great grain-growing States are of such a character as to afford an encouraging augury of future trade when these shall have been matured. With reasonably large crops, there is not likely to be this year another Western corner in grain, not merely because of the severity of the last lesson given in this line, but the stimulus that has been imparted to cultivation abroad in enlarging the acreage by the artificially enhanced prices in the United States which for many months have given a serious check to exports. California, too, is showing that she is ready to take advantage of every opportunity to ship grain abroad, and that her growers can make a satisfactory profit in this line at lower rates than have prevailed. A shipment of California wheat to the extent of 300,000 bushels has just been made over the Texas & Pacific Railway, its destination being England, *via* New Orleans. This is evidently the earnest of greater things.

THE Commercial Club of Chicago has done well in taking measures to found a school for manual training, its members subscribing in one evening $160,000 for this purpose. In the addresses made on the occasion, it was stated as an argument for the scheme that this country is exchanging on too large a scale the products of unskilled for skilled labor; that, for example, in the course of a year England exports of raw material and food amounts to only about $150,000,000 in value, while the exports of manufactures are about $850,000,000 in value. The annual raw material and food exports of France are of the value of $250,000,000, while her exports of manufactures amount to about $350,000,000. On the other hand our exports consist almost entirely of raw material and food, the annual value of these being about $750,000,000, while of manufactures we export only about $75,000,000 worth, and our imports of manufactures are of the annual value of about $250,000,000. The increase of the supply of skilled labor is undoubtedly the great want of the country. It is devoutly to be wished that Cleveland citizens would follow the example of the public spirited men of Chicago. Our population of 190,000 contains thousands of youths who would be glad to avail themselves of facilities for entering on practical training for mechanical pursuits.

NOT the least important among the many attempts which have been made to improve on the Bessemer process of steel making, is the idea of using a stationary converter. It has been pointed out that among the advantages to be gained by such a converter would be the running off of the slag at an early stage in the blow. It has been found impossible hitherto to prevent the metal from escaping through the tuyeres, but a patent has been taken out in England which promises to overcome the difficulty. A trial has taken place with a fixed-up converter capable of holding about a ton. Blows were made with a maximum pressure of four and a half pounds per square inch, each blow taking on an average twenty minutes. The yields were good, and the steel produced of an excellent quality. The patentee claims, among the advantages of the process, its simplicity and small cost of plant, in addition to the fact that no skilled labor is required to handle it. It is also claimed that a two-ton converter working ten hours a day, ought to make 120 tons of soft steel per week, and that it brings a steel-producing plant within the reach of small manufacturers. Another important point in this converter is said to be that it can be worked with four or six tuyeres fixed horizontally; and it is also claimed by the patentee that the converters can be increased in capacity up to any size, and worked in duplicate to any extent.

THERE is an outgo of gold owing to the large increase of imports over exports. The monthly statement for March and April, just issued, shows an adverse change of over $30,000,000 in March

—a decline of $22,454,255 in exports, and an increase of $7,883,579 in imports. In April the imports were $45,218,697 and the exports $23,258,839. The N. Y. *Tribune* observes that no good reason is seen for expecting a desirablech ange in foreign trade until a certainty of large crops here and of large demand for our products abroad promises a great increase in exports, and causes such a general decline in prices that this shall cease to be the best market in the world in which to sell goods of oreign make. Until that time the country will probably continue to run into debt and to make part payments from time to time by shipments of specie. With good crops and good markets next fall any balance against us would soon be cancelled.

IT is much to say of a memorial tribute to so eminent an inventor and metallurgical engineer as the late Alexander Lyman Holley, who was the foremost man in this country in his profession, and with few equals in Europe, that it is in every way worthy of its subject. Yet so much praise must be accorded to the tribute paid by Mr. James C. Bayles, editor of the *Iron Age*, at the late Phil adelphia meeting of the American Society of Mechanical Engineers, and which was prepared at the request of the Committee on the proposed Holley Memorial. Every fact that could throw light on the practicality of Mr. Holley's talents, the soundness of his judgment, and the commercial results of his inventions and improvements were vividly presented, whilst full justice was done to those personal qualities which won for him the solid respect and friendship of the most eminent engineers of this and other countries. We cannot forbear making the following extract from Mr. Bayles' able tribute:

"How much he did to create the Bessemer Steel industry in this country and make our average practice superior to the best foreign practice, has been ably and frankly told by Mr. Robert W. Hunt, of Troy, in a paper read before the American Institute of Mining Engineers. When we remember in how short a time this industry has attained its present extent and prosperity, and with what giant strides it has moved forward to a point at which its statistics overshadowed those of Great Britatn, we cannot fail to find interesting the story of how this was brought about, chiefly by Holley's persistent industry and close study of details. Fully impressed with the possibilities of the Bessemer process as he had witnessed its workings in England, he inspired others with his own enthusiasm, and under his direction the original plant of the Albany and Rensselear Works at Troy was built." ∴ ∴ ∴ ∴ ∴ ∴

"I regard Holley's mechanical talent as eminently practical and characteristically American. He ever sought "convenient means." To facilitate, to simplify, to save labor, economize where economy was profitable,—these were the ends he strove for and attained. Bessemer, probably, has more claim to recognition as a great inventor than Holley; but if we compare the two men we see strikingly exemplified the difference between the inventor and the industrious engineer. Where Bessemer left the process which bears his name, Holley's work began. It was full of possibilities which Mr. Bessemer, distracted by a restless ambition to do something new in marine architecture and other lines of experiment, not always judiciously chosen, seems to have aided but little in realizing. Holley was content to be useful; the typical inventor leaves the question of utility for others to answer, and pushes on. It is as an engineer, rather than as an inventor, that Holley must be considered great; and not alone as an engineer, but as a teacher of the accomplished facts of scientific progress. He had a faculty of imparting to others the fruits of study, observation and experience, which is given to but few men. Not only was he lucid and clear in his description, but even around the dry details of mechanical proportioning and construction he cast a glow of color, and truth when he presented, it because poetic. How much his writings have enriched the engineering literature of the two continents I do not need to tell you. Holley's life and work merit all the honor we can pay his memory, and his title to substantial greatness is beyond the reach of question or criticism."

THE Cleveland Iron Mining Company is now shipping from stock piles aggregating 75,000 ton and the Lake Superior from a winter's accumulation of over 100,000 tons. These two mines will, should there be no further material decline in the market, mine and ship not far from half a million tons the present year.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised befer sendin to press.

OHIO INDUSTRIES.

A NEW blast furnace at Hanging Rock is in progress.

THE Valley Mill at Youngstown is being enlarged.

THE Belfast Nail Works now have 92 machines in operation.

AN Irontown concern has sent a shipment of coal cars to Cuba.

WORK has commenced at the Ironton Hoe and Tool Company's establishment.

THE moulding room of the foundry of Jones & Claypool, Youngstown, is being enlarged.

THE Cleveland Bridge and Car Company has increased its capital from $100,000 to $500,000.

AN additional furnace is being erected at the ten-inch mill of Brown, Bonnell & Co., Youngstown.

THE Evangelist Gold and Silver Mine Company, of Sandusky, has been incorporated with a capital of $1,000,000.

THE Stevens Filter Co., Toledo, report that they are filling extensive orders south and northwest, for ice factories and breweries.

THE Ahrens manufacturing Co., Cincinnati, is turning out some superb types of fire engines, which constitute its specialty.

THE Teller Manufacturing Company, of Cleveland, has changed its name to that of "The Leslie Sewing Machine Company."

THE Niles Tool Works, Hamilton, have closed a contract with the Northern Pacific railway for a full outfit for their new shops.

THE Barney & Smith Manufacturing Co., at Dayton, has lately completed four Wagner sleeping cars, to run on the Michigan Central road.

THE Higley Anti-Friction Car Journal Company, located on Herald street, Cleveland, reports trade good. This Company was organized 18 years ago.

THE new and enormous blast furnace of the Cleveland Rolling Mill Company, with a capacity of 200 tons per day, will probably go into operation on June 1st.

THE Toledo Foundry and Machine Works employ 40 men and are running their works full time. They are manufacturing circular saws, steam engines, architectural iron works and general machinery.

KERR BROS & Co., Hicksville, have just completed an order of 32,000 hoe and rake handles, for Messrs. Mills & Edsell, of Otsego, Mich., and have shipped a car load of handles to St Paul, Minn., and a car load of tent poles to Denver, Col.

MANUFACTURERS through the Mahoning Valley report the dull trade in iron which commenced seven weeks ago, still continuing, and with no present prospects of an agreeable change. Buyers have no difficulty in getting their orders at twenty cents below the card.

HERBERT BAKER, Toledo, is making an important addition to his works by the enlargement of the machine shop to three times its former size. The manufacture of wood working machinery, lathes, planers, saw benches, etc., is a new feature which has just been added.

THE Cleveland Silver Metal Company are about completing arrangements for the manufacture of knives, forks and spoons, by a new process of which they are the sole owners. They possess some of the finest machinery to be found in the country for the manufacture of such goods. Theirs will be the only works of the kind west of New York.

WILLIAM L. CLARK, a well known iron man from Pittsburgh, and a former resident of this city, has purchased an interest in the Atkins Mill at Newburg. It is probable that a large hoop mill will be added to the iron plant, which promises to be an extensive establishment.

THE Holt Manufacturing Co., Cleveland, announces that since April 1 the portable forges made by it have been withdrawn from the hands of dealers, and for the future will be sold direct to consumers. This change in business policy has brought about an important reduction in price of their goods.

HENRY K. HESS, dealer in paints, oils, varnishes and builders' materials, No. 223 Belmont street, Bellaire, is full of business, as usual, at this season, and reports an unprecedented increase in trade. Mr. Hess is an expert in paints, oils and varnishes, and with his knowledge of the markets and wide business connections, is in a position to make it the interest of all using builder's materials to resort to him.

THE Gendron Iron Wheel Co., Toledo, are soon to build a new factory, 60x100 feet, four stories and basement, which will increase their capacity to fully three times what it is at present. They will place in it from $15,000 to $20,000 worth of the most improved wood and iron working machinery, and, when completed, they will employ 100 men. It is expected the new works will be in running order by October 1st.

MESSRS. Jona. Smith and Edward C. Post, manufacturers of elevators, shafting, &c., Toledo, have dissolved partnership. The Post, having purchased Mr. Smith's entire interest, will continue the business at the same establishment. His particular attention will be given to the manufacture of all kinds of hydraulic power and hand elevators, as well as to that of shafting, pulleys, hangers, &c., the qualities of which are well known to those who favored the late firm with any of their orders.

THE advantages of Steubenville as a manufacturing point are undoubtedly great, and a Board of Improvement has been organized to make these better known. It is located on the right bank of the Ohio river, 60 miles below Pittsburgh and 400 above Cincinnati, on the P. C. & St. L. or Pan Handle route. The manufacture of iron, glass, pottery, railroad cars, furniture, &c., is carried on extensively, stimulated by abundance of cheap and good fuel. Veins of coal are found at almost every depth from the surface, but the principal resource is vein No. 6 of the Ohio Geological survey, one of the most important of all the coal seams.

MESSRS Crol & Rank of Canton are putting in the Stevens Rolls——Samuel Beck, Spring Mountain, has placed an order for a complete mill outfit, including millwright work, with C. F. Miller of Mansfield.——The "Eureka Mills," Columbiana, C. Theiss & Sons, are shut down, and are putting in the Case Rolls and System.——M. J. Wheeling, Port Washington, is building a six-run merchant mill.——C. F. Miller, Mansfield, recently furnished a middlings purifier and middlings mill to D. H. Rowland of Richwood.——The Woods Flour and Woolen Mills, Powhattan, have been purchased by the Hofer Brothers, formerly of Hannibal, who will remodel the entire building and put in new machinery.—*Amer Milier.*

OUR Steubenville correspondent writes: The Steubenville Pottery Company, manufacturers of stone china and decorated ware, started their business here in January, 1881. They employ eighty hands, and have three kilns for stone china in operation, besides running two large decorated kilns. Their great specialty is decorated ware, in which they are unexcelled. With the demand for tasteful forms and choice devices which they render in clear and brilliant colors, their business, as may be supposed, is good and steadily increasing. Theirs is the only iron-stone pottery in Steubenville. Most of their ware is sold west and northwest, and no complaint ever reaches them of crazed goods, which, for the sake of any uninitiated readers, I may explain is the technical term for those of

which the enamel is cracked. This company is the only one in Ohio who make a specialty of decorated ware, this ware being printed ware, gilded ware, and hand-painted ware. The officials of the company are William B. Donaldson, President; W. R. E. Elliott, Vice President; Alfred Day, Secretary; H. L. Bloor, General Manager; Thomas Haden, Superintendent Decorating Department.

THE furnace at Niles, Youngstown, so long known as the Thomas Furnace, has been leased by the Arnold Furnace Company, composed of John M. Glidden, of Cleveland, secretary of the Republic Iron Company, and W. R. Drake, of Warren, who has been its manager for some months, and who has long been the manager of the Girard. The iron that is to be made at this furnace is to be called the Arnold iron. Their specialty will be soft, all ore, foundry iron, being a mixture of the celebrated Mineral Ridge, black band and Arnold ores. The furnace will be managed by W. R. Drake, and F. A. Drake, late of the Girard Iron Company, will be the superintendent. Mr. J. R. Thomas, owner of the Arnold furnace, is making some extensive improvements. He is putting in a large new engine made by the Columbus Machine Company, and an elevated track through the stock house. This is going to be one of the nicest little furnaces in the valley.

FEW structures since the vertebral keel of Adam was laid in dust some time since have been built so directly from the earth as East Liverpool. When James Bennett, a rambling English potter out of a job, went there in 1838 and discovered an eight-foot vein of yellow clay in the hills above the slope, on which the lazy little village of about 300 inhabitants dozed in the sunshine, he found work not only for himself but for 3,000 others. Like the miser who conceals his gold between the mattresses until some burglar slips it from under him in the night, the villagers had slept upon their wealth, and walked and worked above it, until a foreigner came and taught them its value. Like a superficial hen, they scratched themselves lean for the few crumbs lying in the top dust, not knowing that a fat and luscious earth-worm was buried just under the ground. James Bennett had been a worker in English clay before the ambitious discontent which begets improvement, drove him to this country, and to his sight there was as much beauty in that belt of yellow dirt which girt the bellying hill as the golden domes of Peru had for the greedy eyes of Pizarro's Spaniards. In that vein of clay he laid the foundation of the American pottery business. The first kiln of yellow ware was fired the next year, and sold with profit. The success of this venture attracted others. The business grew, but throve indifferently. Other potteries were put up, and some of them made money for their builders, but as in every other enterprise, the success of one man breaks up a dozen others. Men saw their neighbors making money out of mud and thought it easy. They put their capital into the business likewise and without any aptitude or previous training for the work, they lost it. But the town grew, and in the next two decades increased five fold. Bennett, Taylor and Spieler, the last named a German, went from East Liverpool to Trenton, and made the first white ware burned there. To-day East Liverpool has a population of about 7,000, almost one-half of whom find employment in her 25 potteries.

MAINE.

A STOCK company has been organized at Lewiston for the manufacture of Hooper force pumps. Capital $50,000.

A PULP and paper mill is soon to be begun at Great Falls, 12 miles above Bangor.

MASSACHUSETTS.

A SPECIMEN of heavy machinery is to be seen at the machine shop of Williams & Lowrey at Newburyport, it being a stamp battery for a party at Pepperell, Massachusetts. This is a machine for pulverizing ores, principally gold, and some idea of its immense power may be gathered from the fact that the direct crushing force consists of six stamps, or pestles, each one of which weighs 750 pounds, and falls a distance of 10 inches 90 times a minute. The whole affair is about 13 feet high and weighs eight and one-half tons. A second battery is also under way at this place, which will make the fourth they have built.

THE American Bolt Company, of Lowell, is now filling large orders of bolts and nuts for the Mexican Central Railroad Company, and is using 150 tons of iron per month.

CONNECTICUT.

THE Bradley & Hubbard Manufacturing Company, at Meridan, who now have acres of brick factories, are about to add another building, to introduce brass rolling as a new department.

A stock company, with a capital of $100,000 subscribed, has been formed at Wallingford to make bronze goods.

NEW YORK.

THE new Crinoline factory at Greenwich is fast approaching completion.

THE Burden Iron Works of Troy give employment to 2,300 men. They propose to greatly enlarge their works during the coming summer.

THE Cayuta Wheel and Foundry Co., Waverly, have a monthly product of 3,000 wheels, besides other castings.

AT Corning, B. W. Payne & Sons produce 35 to 40 engines per month.

THE Lake George Pulp Company, at Ticonderoga, are associated with parties who are making arrangements to build a large paper mill.

THE Niagara Flouring Mills, Niagara Falls, the proprietors of which are Schoellkopf & Mathews, of 20 Central Wharf, Buffalo, have a capacity of 1,000 bbls. per day. The firm are millers of patent Minnesota wheat flour.

NEW JERSEY.

A WELL-KNOWN silk manufacturing firm in Paterson, N. J., have, in one year, produced broad silk goods which, if laid end to end, would extend for a distance of 312 miles. During the same time they furnished 2,500,000 pieces of narrow fabric, which, if measured in the same way, would stretch over 1420½ miles. This is the product of only *one* factory.

JOHN A. ROEBLING'S SONS, wire rope manufacturers, have just finished the last rope for the East River Bridge between New York City and Brooklyn.

TRENTON Vise & Tool Works, manufacturers of vises of all kinds, picks, mattocks, grub hoes, and various kinds of hammers and other tools, Herman Boker & Co., proprietors, have all the business they can do. This is the largest concern of its kind in the State, and one of the largest in the country.

PENNSYLVANIA.

THE new sheet mill being built for Laufman & Co., Apollo Iron Works, Pittsburgh, will increase their capacity 450 tons per week.

THE fifty furnacemen of the Bethlehem Iron Co., Catasauqua, who have struck for a 20 per cent. advance, have had their places filled by others. The wages paid are as follows: Keepers, $1.80; helpers, $1.50; casters, $1.54; fillers, $1.50; cindermen, $1.48; stock breakers, $1.26.

ILLINOIS.

SARGENT, Greenleaf & Brooks, Chicago, have sold $30,000 worth of their bankers' time locks the past twelve months.

THE most prominent and largest industry carried on in Ottawa is the glass works, one running two furnaces, and manufacturing all classes of bottles, lamp-chimneys and fruit-jars, and the other running three furnaces and making flint glass as well as bottles. The demand now at both establishments is beyond their capacity. About half a million dollars' business is done yearly. The finest quality of sand is obtained near the mills, in the city limits. With the exception of soda-ash, everything for the manufacture of glass in all shapes lies almost at the very door of the furnaces.

THE Illinois Starch Company, Ottawa, have an extensive concern which consumes annually about 300,000 bushels of corn and considerable wheat, and turns out daily 14,000 to 16,000 pounds of a fine quality of starch. Their business amounts to about $100,000 a year.

A LARGE agricultural concern in the city of Ottawa manufacture a great many corn-shellers, wagons and cultivators, doing nearly $200,000 worth of business every year.

THE Gates & Scoville Iron Works, Chicago, are building a rock breaker, having a capacity of from 300 to 400 tons a day, for the United States Government, to be used at Mare Island, California.

CUTLERY works have been established at Marres, employing 30 hands.

IN a few weeks the entire works of the North Chicago Rolling Mill Company at South Chicago, which were commenced some time since, will be completed. The buildings are of a most massive character. Two of the blast furnaces turn out 2,200 tons of pig iron per week. Instead of melting the pig iron previous to converting it into steel, the molten iron will be carried directly in ladles, containing ten tons each, every twelve minutes from the blast furnaces to the converters without reheating. The converters are three in number, with a capacity of ten tons each, and all have granite linings.

INDIANA.

THE American Foundry Co., New Albany, have just completed two double polishers for the plate glass works of that city, weighing 50 tons each.

THE Indianapolis Stove Co.'s works now have a capacity of 13,000 stoves per annum.

MISSOURI.

A FACTORY for the manufacture of furniture veneering from gum wood, so abundant in almost all sections of the South and Southwest, has been erected at Poplar Bluff, on the line of the St Louis & Iron Mountain Railroad. The grain o this wood is said to be very fine, and when polished remarkably beautiful.

THE firm of Broderick & Bascom, St. Louis, has been incorporated as a rope company, with capital stock of $100,000.

THE Mississippi Glass Co., St. Louis, manufacturers of green and amber glassware, are executing an order for 420,000 bottles.

WISCONSIN.

THE J. I. Case Plow Company, Racine, turn out 3,000 plows annually, and employ 250 men; and the J. I. Case Threshing Machine Company of Racine, employ 600 men and consume 16 tons of castings a day. The company contemplate the erection of a machine shop of brick, 600 feet long, 300 feet deep, and five stories in height.

COLORADO.

THE capital stock ($50,000) necessary to establish a new iron foundry at Leadville has been obtained, and the works are to be erected at once.

PITTSBURGH INDUSTRIES.

[FROM OUR SPECIAL CORRESPONDENT.]

PITTSBURGH, May 11, 1882.

Business generally in this city is thriving in most of its branches.——The Hussey Manufacturing Co., 27th and Railroad streets, manufacturers of improved Smith mowers, machine castings, etc., and who make a specialty of the only mower with 7-foot cutter bar, are doing well, employing steadily 50 men, and this although they have been in the business only one year. Their success is plainly attributable to the excellence of their productions. The company, of which Mr. J. G. Hussey is President, has an increasing demand for their shovels, spades, scoops, chisels and wedges. I should add that the main points about the Smith mower manufactured by them are its lightness of draft, due in part to the small amount of gearing used, the complete utilization in its construction of all the driving power, and the absence of side draft, the excellent quality of the work done, its capacity to mow on the most forbidding ground, even to cut heavy, wet, tangled grass, its ease to horses, and its arrangement for the driver, who is not liable to be jerked or pitched by a sudden stoppage. A warranty is given with each and all tools.——Mr. W. A. Bunting, stencil works, 42½ Sixth street, continues to do a flourishing business in his steel stamp and stencil cutters, and is filling large orders for his seal press, as well as in stencil cutters' tools and supplies. He is in want of a steel letter cutter. A department of the works is devoted to general engraving, which is produced in the most perfect styles, securing for Mr. Bunting quite a reputation in this line.——The activity of building gives to the well known firm of A. Northrop & Co., 97 First avenue, all they can do in supplying sheet-iron roofing and building materials. Northrop's roofing, which is patented, and possesses every desirable quality, is suited to all classes of buildings; can easily be applied, requiring for this no extra tools; and no nails, screws or rivets are driv

en through the sheets, thus allowing for contraction or expansion. Drip crimped sheet-iron siding was shown me which, whilst equal in appearance to the best wood weather-boarding, is highly ornamental and cannot fail to be strengthening to a building; it looks neat as a door casing. My attention was called to the firm's paneled iron ceil ing, which is admirably adapted for store-rooms, warehouses, factories and mills.——A look into Mr. David Gram's manufactory of rokaways and buggies, corner Penn avenue and 31st street, disclosed a gratifying activity. Twelve men are employed. Mr. Gram has been in business 12 years, and is manufacturer and patentee of curtains which are invisible when raised, as they are concealed in the top of the carriage; they have no springs to get out of order.

OHIO COAL MINES.

ADDRESS BY

R. S. PAUL,

BEFORE THE

Ohio Institute of Mining Engineers.

The first coal mines opened in our State were drift mines, and until of late years the extent of their workings required little assistance from the surveyor and none from the mining engineer. What little mine surveying was done was of the rudest character, reliance being placed on the magnetic needle alone for guidance in tracing the underground lines. The short distances to be determined made this class of work suffice. But even this aid from the surveyor was not generally employed, and points in the bank were often located by striking with hammers on rocks on the surface and estimating by the sounds so produced the corresponding points below. Very few mine superintendents were skilled or educated men. Coal was cheap with but slow sale for it. Wood, chiefly used as fuel, was abundant, with a seeming necessity to get rid of it as fast as possible, while the means of transportation were very limited; hence there was little call to even locate lines of ownership. But all this is now changed and the practical miner, costly machinery, the skilled superintendent and the educated mining engineer are in demand. Already many localities once supposed to possess inexhaustible stores of coal are being rudely awakened to the fact that the wanton waste in the past if continued but a short time will render their coal fields worthless, and that the mining of coal is a business demanding the best of talent. The mining engineer has gradually become a necessity to the working successfully of our Ohio mines, nor can his work be successfully undertaken by the superintendent or anyone else. Mining engineering is a profession in itself, demanding especial skill and its own line of instruments. Let us now define what are the duties of the mining engineer in our State, furnishing also an outline of his work.

The mining engineer must be possessed of the theory of land surveying, and of its practical application. He should have a general knowledge of civil engineering. He should be a good mechanical draftsman, and acquainted with the geology of his section or valley and of the different methods of working a coal mine, the sinking of shafts, prospecting for coal, and with the construction and working of mining machinery. In engineering in all of its branches the engineer is the one who directs, who marks the way, who plans the work. Until lately in our State, owing largely to the facts already stated, the superintendent in most cases performed all the duties of the mining engineer—excepting, perhaps, the land surveying branch—in addition to his own proper duties; and to some extent this is the case still. If he performs all his own duties as superintendent, he does well; but if in addition he is the underground boss and the mining enuineer of his mine, he becomes one of the hardest-worked men we know of, and must soon break down; nor can he give his full attention to his own proper business. The result has not been unfrequently the neglect and financial ruin of the mine. However, his employers do not as a general rule ask him to mine coal in addition, but do in some cases require him to keep the books, pay the men and sell the output. Where the superintendent, under such circumstances, has been neither skilled nor educated, and the employers grossly ignorant of all that pertained to coal mining, it is not surprising that mining should have proved so frequently ruinous. In a mine in the Tuscarawas Valley, a superintendent, confident in his capability of judging for himself of the direction to drive an entry to meet other workings, after expending over $1800 in the attempt, called on a mining engineer to locate the points for him, who found out that the entry had been driven to a point some distance further from the point desired to be reached than where he commenced. Instances could be cited where shafts have been located by the mine superintendents that did not reach the point desired within several hundred feet, requiring a mining engineer to be subsequently employed and a new shaft sunk. In short, it can truthfully be said that the amount lost each year by not em ploying competent mining engineers in the State would pay a handsome income to all the mining ingineers that it contains.

[*To be continued.*]

MISCELLANEOUS RECEIPTS.

To Clean Polished Marble.—The *English Mechanic* gives the following recipes: Polished marble when soiled may be cleaned with a weak lye of potash and soft soap. Muriatic acid is the best thing for removing iron stains; it should be applied with a rag, but if used too freely or too strong will make the surface rough. The following is the best recipe for removing ordinary stains from ivory or marble: Dust lime is mixed with the strongest soap lye pretty thick, and instantly with a painter's brush, laid on the whole of the marble. In two months time wash it off perfectly clean, then have ready a fine, thick lather of soap (soft) boiled in soft water; dip a brush in it and scour the marble, not with powder, as in common cleaning. This will, by very good rubbing, give a very good polish. Clear off the soap, and finish with a smooth, hard brush till the end be effected.

To Keep Harness Supple.—Add a little glycerine to the grease applied to harness, and it will be kept in a soft and pliable state in spite of the ammoniacal exhalations of the stable, which tend to make it brittle.

India Rubber Varnish.—Dr. Elder gives the following recipe for making India rubber varnish: Inclose 30 grams of finely cut caoutchouc in a capacious linen bag, aud suspend this within a flask containing a liter of benzine, by means of a thread held fast by the stopper, so that the bag remains near the surface of the liquid. In the course of six or eight days, the soluble portion of the caoutchouc—about 40 to 60 per cent.—will pass into the benzine, while the contents of the bag will expand enormously. The clear solution which is quite viscous, and contains 1.2 to 1.5 per cent. of caoutchouc, is then carefully separated. The swelled contents of the bag retain one-fourth to one-third of the benzine used, and may be utilized for the preparation of an inferior kind of varnish. A solution of India rubber in benzine, kept in half full bottles, is decomposed on exposure to light, which may be seen by the change in the solution from a viscous to a thin fluid condition. Even in the dark this change goes on, but it takes about three times as long.

Purifying Lubricating Oils.—A German chemist, M. Kœllner, makes use of the following process for purifying lubricating oils, rendering them fit to be used again: He first puts the liquids into a lower part of a reservoir, closed at the top by a perforated lid; the residue is deposited at the bottom. By raising the reservoir at one end the oil passes into a second reservoir, then into two boxes joined together, filled with very clean cotton waste, and separated by a vertical perforated plate. The air circulates freely in the different apparatus, and the oil is then in a condition to be used immediately.

To Bleach Ivory.—Peroxide of hydrogen is used in Sheffield to bleach the inferior ivory for knife-handles. The mode of procedure is as follows: Place, say, two quarts of the liquid in a stone pot, adding four oz. liq. ammon. fort. 880 degrees, immerse the handles, and put over a common shop stove for twenty-four or thirty-six hours; the handles are then taken out and gradually dried in the air, not too quickly or they would split. The deep color of the ivory is removed, and a beautiful pearly-white ivory results when polished. The ivory is previovsly treated with a solution of common soda, to get rid of greasy matter and open the pores.

Transparent Paint for Glass.—Take for a blue pigment, Prussian blue; for red, crimson lake; for yellow, Indian yellow; for brown, burnt sienna; for black, lampblack; and for other shades a mixture of the appropriate colors. Rub them in a size composed of Venice turpentine 2 ounces, oil of turpentine 1 ounce, and apply with a brush. For temporary purposes fine and brilliant colors are obtained by dissolving aniline dyes in white shellac varnish, but they are fleeting and do not always pay for the trouble.

To Clean Brass.—Rub the surface of the metal with rotten-stone and sweet oil, then rub off with a piece of cotton flannel, and polish with soft leather. A solution of oxalic acid rubbed over tarnished brass soon removes the tarnish, rendering the metal bright. The acid must be washed off with water, and the brass rubbed with whiting and soft leather. A mixture of muriatic acid and alum dissolved in water imparts a golden color to brass articles that are steeped in it a few seconds.

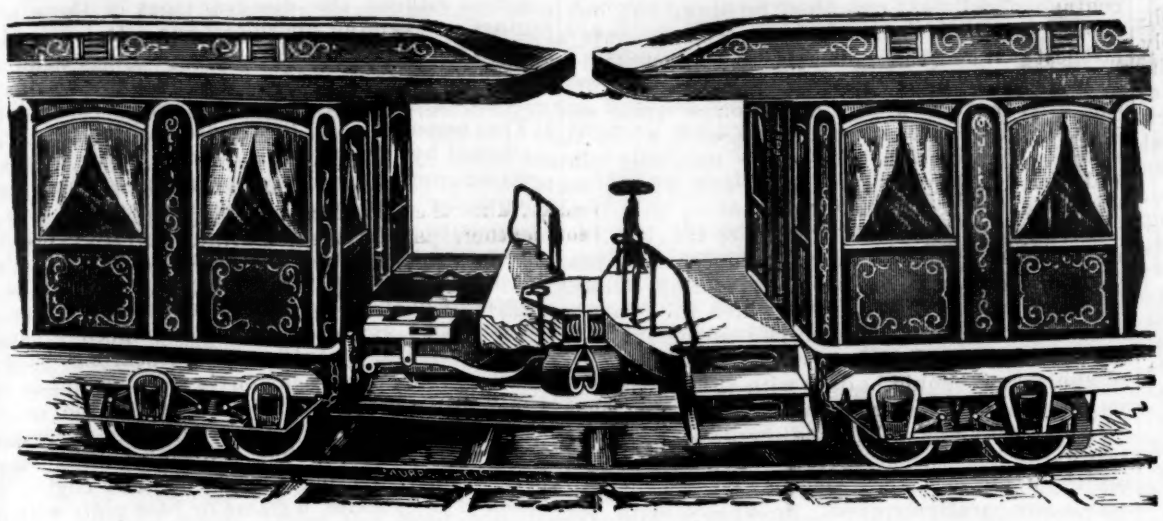
Artificial Refrigeration.

The production of cold and even ice by artificial means is now a necessity in many industrial processes. According to the American systems of brewing, great cold is required not only during the actual brewing process, but also for months afterward while the beers are maturing in the cellars. Ingenious contrivances have been devised for the artificial production of ice, and it may not be uninteresting to give some explanation of the theories on which these machines are founded. When a volatile liquid evaporates, a large amount of heat is necessarily absorbed by the resulting vapor, and is rendered latent. This heat is taken either from some of the remaining liquid, or else from the medium in which the liquid is in contact. The cold produced by evaporation is very evident with a volatile fluid like ether; when a little of this liquid is placed in the palm of the hand an intense feeling of cold is observed; the ether, in evaporating, must absorb heat, and therefore takes it from the nearest body, which is the hand, and thus produces a corresponding reduction of temperature. The evaporation of volatile liquids is greatly assisted by a reduction of pressure; and, thus, if a little ether be placed in a shallow dish, floating on a thin layer of water, and the whole be placed under the receiver of an air-pump, there is not much difficulty in freezing the water by a rapid exhaustion of the air; in this case the vapor of ether is renewed almost as fast as it is formed, and fresh quantities of liquid ether are thus volatized. The various ice-making and refrigerating machines are constructed so as to utilize this property possessed by all volatile fluids. If the ether be placed in a metallic vessel exposing a large surface to water or any other fluid which requires to be cooled, all the heat necessary for the volatilation of the ether must be taken from the water; the volatilation of the ether is assisted by means of an air-pump, and the ether vapor is then conveyed through pipes to another vessel also surrounded by cold water, where it gives up the same amount of heat again, and is thus converted back into a liquid. In this way a comparatively small quantity of ether will cool or even freeze an indefinite quantity of water, and the whole of the ether can be condensed again into the liquid state. Instead of ether, liquid ammonia, sulphurous acid, or other very volatile substances may be used, and a variety of complicated mechanical arrangements are introduced to assist in the volatilization, condensation, and preservation of the volatile agent used. These mechanical arrangements have been so far perfected that even water itself has been used as the evaporating agent, and ice has been successfully produced by such means. Great cold and even ice has also been produced by the expansion and contraction of atmospheric air by machines constructed on a similar principle to those we have just referred to. For brewery purposes ice is not actually required, but rather a reduction of temperature equal to about 25° F.

The First Iron Vessel on The Lakes.—This was the government steamer Michigan. It was built in sections in Pittsburg in 1843, and was taken to Erie, there put together, and launched in 1844, and has ever since been in commission, rendering valuable service to the United States government. Its advent among the craft of the lakes was a severe blow to the prejudice in favor of wooden vessels then existing.

COWELL'S CONTINUOUS PLATFORM AND AUTOMATIC COUPLING.

If there are any improvements in railway equipment the general adoption of which would be more gratifying to the general public than any others, they would consist in the application of means by which the jolting and jarring of carriages would



be prevented, and such a connection of these carriages effected by close contiguous platforms maintained under all conditions of speed and track, and supplying a continuous floor throughout a train. As to automatic couplings, the use of which has been advocated by the leading railway journals in this and other countries, as saving the life and limbs of employes, and which railway officials acknowledge would save time in the mak ing up of trains, a number of drawbacks to such couplings have militated against their adoption, apart from variations in the height of the floor-beams of carriages, cars and trucks of different lines. Cowell's Automatic Coupling for passenger cars, which is also adapted to stock and freight cars, meets all requirements, and our belief is that in view of its perfect mechanical action, its adaptedness to curves and inclines, and its ample security, its adoption by all the chief railroads of the country is but a question of time. After coupling the cars, which is effected by the operator with the greatest ease, the pressure is applied to springs which hold the buffers or supplemental platforms close together. Cowell's Platform is operated by means of the lever and cam, and a pressure is obtained ten times greater than that of any other device. This serviceable invention besides its convenience, contributes in a most material degree, to the steadiness of the train. It can be used, too, with any automatic coupling, a point of importance to railways who have adopted such. The testimony that comes from the N. Y., P. & O. railroad, on which Cowell's Platform has been in use for nine months, is that it shows no appreciable wear, and will probably last as long as a car itself; that it allows of a car being run at a higher rate of speed, and with greater safety than any other in use, and besides preventing jerking in starting and stopping, does away with the unpleasant rolling motion at the ends of coaches.

Railway companies, as all know, are burdened with solicitations for the adoption of various inventions, many of which are acknowledged improvements, but which would involve an outlay not commensurate with the advantage gained. It is otherwise with Cowell's Platform and Automatic Coupling. The minimising the annoyances of railway travel is on every hand acknowledged to be to their interest, whilst it is demonstrable that the adoption of these great improvements accords with considerations of economy.

The organization of the Company, which possesses ample means for carrying out orders promptly, is a strong one. The officials are: G. E. Herrick, President; R. A. Cowell, Vice President; H. W. Stager, General Manager, and J. F. Herrick, Secretary and Treasurer. The Cowell Platform and Coupling Company has its offices at 249 Superior street, Cleveland, where models of both platform and coupling can be seen.

THE practical $5 Standard Electric Belt advertised in this paper should not be confounded with other electric goods.

Copper Ore Refining in the United States.

BY T. EGLESTON, PH.D., NEW YORK.

ARTICLE I.

When the assay shows that the furnace is ready, ladling is begun, and a test is made from time to time, during the casting. During the time of casting, it is necessary that the gas in the furnace should be kept neutral, or that there should be an equally balanced oscillation between an oxidizing and neutral action, so that the copper will neither be under-poled nor over-refined. The casting-door, remaining open during all the time of the casting, furnishes some oxygen, but not too much if the fire place is in proper condition, as the air goes directly up the chimney. During the whole time of casting, the face of the copper must, for this reason, be kept covered with charcoal, and sticks of cordwood kept burning on the surface of the charge so as to make the atmosphere reducing. It rarely happens that the furnace is kept in the same condition during the time of casting, so that frequent tests must be made to see when the pitch changes, and occasionally the operation of casting is stopped and the furnace closed to bring the heat up and the pitch back to its proper condition. A well-regulated furnace ought to have the temperature as well as the quality of the heat such that no stopping will be necessary during the casting. It is, however, an exception to have the furnace work continually without stopping. Sometimes the furnace is too cold. Other things being equal, this does not affect the quality of the copper, but it makes the ingots dirty looking and increases the difficulty of the work.

The copper is cast into different shapes, according to the uses to which it is to be put. If it is to be made into rods or wire, it is cast in rectangular iron molds, which have been previously washed with wood ashes, and dusted with fine charcoal from a bag, or have been smoked with wood, to prevent the adherence of the copper to them. These molds are from 25 to 40 inches long, and from 3 to 7 inches square. They are made to taper for about 6 inches from one end to about 2 inches square on the bottom and sides, the top remaining flat, so that they can be made to enter the rolls easily. They are always made of the size required for the number of ladles they are to contain, and generally weigh from 80 to 100 pounds. When the copper is to be rolled into sheets, it is cast into cakes, which are of any size or thickness required. The small cakes or plate-molds are usually square, the larger ones rectangular or round. They are generally from 18 to 32 inches square, and 10 to 15 inches deep. The smaller ones are usually 14½ by 18½ inches, and about 12 inches deep. In such a mold, five cakes about 2 inches thick will usually be made. A cake two feet square and 4 inches thick will require fifteen ladles of 40 pounds each. Round cakes 3 feet in diameter and 1 inch thick are sometimes made, which will weigh as high as 2,500 pounds. The largest square casting-molds are 3½ feet square, 10 inches deep, 1½ inches thick on the sides, and 3 inches on the bottom. A cake 3 inches thick, made at Pittsburgh, by C. G. Hussey & Co., from such a mold, weighed 3135 pounds. When the copper is to be used for melting, it is cast into ingots, in copper molds, the ingots weighing from 16 to 17 pounds.

A great deal of importance is given by many to the color of copper, and many qualities of it are distinguished in the market by their color. The temperature, at the time of casting, will not only affect the color, but will also change the appearance of the fracture. This so well known that most copper sellers ladle at as low a temperature as possible, in order to have the grain fine. The real and only test is not the color, but that the copper should be tough and malleable at all temperatures. Buyers, however, sometimes require copper to be of a certain color on the exterior, which, as is well known, does not give any positive indication of the quality of the copper. The coloring is only superficial, and, independently of the heat of the metal at the time of casting, can be given in several ways. Salt put into the water makes the copper dark red. This salt is simply put into the bath into which the copper tips. White pine shavings put into the water make the copper yellow. The same takes place whenever the ingot, being thrown over, hits the wood of the sides of the water-bosh. To form these colors, which are asked for especially, the ingot is tipped out upon a shovel, and then dropped into the water. The greatest care is taken to keep the products of each mining company separate. Every company has its own ingot molds with its name on the bottom, so that each of the ingots has the name of the mine from which the copper comes cast on it.

[TO BE CONTINUED.]

What Electricity May Do.

All great discoverers are great revolutionists, or, rather, it may be said that all great discoveries contain within themselves the germs of many revolutions. At present the application of electricity is only in its infancy, but already anyone who is familiar with the dissolvent action of the steam-engine on the old order which existed a century since can understand that the dynamo machine and the storage battery may yet effect a very unexpected transformation of the world's industrial organization. The political and social significance of recent discoveries in the application of electricity is increased by the disappearance of the old, unreasoning conservatism which fifty years ago formed so great an obstacle in England to the development of railways. Electricity, therefore, has far fewer obstacles to overcome than those which steam has vanquished: and if, as is most probable, it is destined to bring about great changes, they will be brought about with a rapidity partaking somewhat of its own character. By facilitating the distribution of force it will tend to promote decentralization, and possibly may bring about a more equable distribution of wealth. Electricity, unlike steam, does not necessitate the concentration of capital. Steam blew up aristocracy, but plutocracy may be smitten by the thunderbolt. A steam engine is only potent within the range of its shafting. A dynamo engine at the nearest mill-race can operate a mill or manufactory situated miles away. No practical man believes that there is any prospect of placing the existing modes of production in the hands of the representatives of the whole community. Both the surface of the land and its mineral treasurers have passed irrevocably into the hands of private owners. But what promise to be the motive forces of the future belong to no man. The tides, the cataracts, and the winds are the heritage of all. If they are to be utilized the public spirit of the local communities, which every day shows more impatience with exisisting monopolies, may be relied upon to take prompt action to prevent their *exploitation* for the benefit of a few.

THE WEIGHING MACHINE.—Justice blindfolded, with her scales equally balanced, is a very suitable motto for scale manufacturers. The counter weighing machine is now being produced in many forms and patterns, they are all made upon one of two principles as regards action. There is what is known or called the principal of acceleration and the principle of vibration. By the principle of vibration is meant the power of re-action or return movement when set in motion, which is most generally applied to scales with the scale beam. The principle of acceleration is that of hastened velocity, or no return movement when set in motion. English counter weighing machines are all made upon the accelerating principle, the difficulty not being overcome of making the machine vibrate or re-act, and at the same time turn finely.

"BLUE GRASS ROUTE OF OHIO."—The Cleveland, Akron and Columbus Railroad.

FACTS
For Machinists, Manufacturers and Others.

PETROLEUM AS FUEL.—We are well aware, says the Railroad Gazette, that there are certain considerations in favor of petroleum from a practical point of view, which recommend its use, notwithstanding its greater cost as compared with coal. To these considerations we will devote a few words, as showing the possibilities ahead of petroleum for heat production. First, it is probable that, at least, 15 per cent., and possibly 25 per cent. of the coal that is now put into the fire doors of locomotive escapes from the smoke-stack unburned in the form of cinders, black smoke and unburned gases, and as unburned coal through the grate. If now petroleum can be burned in such a way that all of it is consumed, and very nearly its theoretical heat-producing power is developed, then certainly quite a percent-of the difference between coal and petroleum disappears. Again, locomotives for burning coal are by necessity constructed with quite large flues, in order to avoid clogging by the cinders. This, of course, makes the heating surface less; and it is entirely possible that a petroleum-burning locomotive may be so constructed with smaller flues and more of them, with consequent greater heating surface, that a larger percentage of the heat generated will be utilized in the case of petroleum than in the case of coal. Still again, when rapidly burning a solid combustible on a grate, when a part of the combustible is gaseous or becomes so, and consequently needs air above the fire for its complete combustion, it becomes exceedingly difficult to so proportion the air drawn through and over the fire that just the right amount shall be used. Doubtless, therefore, in very many cases, far too much air is used, and a reduction in the temperature of the hot gases takes place, with consequent loss of efficiency. If in the case of petroleum a proper proportion can be maintained between air and combustible, so as to give higher temperature to the products of combustion as they enter the flues, a gain in efficiency will be effected, which will help again to diminish the difference between coal and petroleum.

TIN IN MEXICO.—The special correspondent of the *Chicago Mining Review* at Decatur, Col., affords the following important information: We were recently shown by Mr. T. T. Eyre, of this place, some very fine specimens of wood tin, *i. e.*, oxide of tin with a small per cent. of silica, which came from the tin mines near Durango, Mexico. These specimens are beautifully variegated, and closely resemble some of the finer specimens of agatized wood, only they are much heavier. Having in the past few months, noticed many articles in the newspapers on our present and future supply of tin, we made some inquiries concerning the locality from which the specimens shown us came. Mr. Eyre says he spent several years in Durango, Mexico; that he smelted the tin ores there with great ease, even in furnaces constructed in the most primitive manner, using nothing but oak charcoal, which he obtained in great abundance. The tin after being smelted ranged in price from 15 to 35 cents per pound, according to the fineness and care taken in preparing it for market. The ore is found in fissure veins and placers, that from the latter being the richest and easiest worked, as many of the veins carry wolfram (tungsten) with the tin ore. The extent of the tin fields is quite large. Jos. Wharton, the well-known owner of the nickel mines of Pennsylvania, Mr. Eyre, and others, have a grant from the Mexican Government embracing over 400 square miles of tin placers. There are also within the grant over 100 veins carrying tin ore. Besides these there are other tin fields in the same section lying dormant. During the last Mexican revolution Mr. Eyre was driven out of the country; but with the completion of railroads to Durango there will be no further trouble with the Mexicans, and with cheap freights tin can be delivered in New York City for 18 cents per pound, and leave a fair margin for profit. Mr. Eyre estimates that their mines alone can be made to produce enough to supply the American market for many years to come. Mr. Eyre also showed us some fine specimens of white topaz and duranite, which he obtained in the tin placers.

FLEXIBLE PAINT FOR CANVASS.—Yellow soap 2½ pounds, boiling water 1½ gallons; dissolve; grind the solution while hot with 125 lbs. good oil paint.

MANAGEMENT OF BOILERS.—The best preventive scale is probably a good filter-heater, in which the feed-water can be raised to a temperature sufficiently high to deposit the matter held in solution, in the filter of the heater, before entering the boiler. A practice which facilitates the making or hardening of scale in boilers, is that of blowing out the water under a high pressure The only time to open the blow-cock when under steam is in the morning before starting the engine, a small percentage of sediment may then be blown out, but it should only be continued for a few moments at farthest When the boiler is to be emptied it should, if circumstances will allow, stand until the brick-work, water, etc., becomes quite cool, then the blow-cock can be opened, and while the water is running out,, take off the man-hole plate and with a hose wash the tubes and sheets well while the sediment is still soft. With this treatment very little scale will adhere to the iron, but all that does should be dislodged as soon as possible, and on every occasion, by scaling, chisels, and hammers. Any sediment which the washing fails to remove should be scraped out before refilling the boiler. In cases where blowing out is compulsory it should be done with as low a pressure as practicable. Water should be run out whenever it shows signs of being dirty; about once in two weeks is sufficient, as there is no use of emptying the boiler of water which has made its deposits and is comparatively good, to replace with that which contains matter in solution to form new scale. The great objection to scales is, that being a non-conductor of caloric, it prevents a large proportion of the heat of the furnace from entering the water, the heat escaping up the chimney, causing a waste of fuel and decreasing the evaporative power of the boiler. With a heavy deposit of scale there is great danger of the iron which is in contact with the fire becoming burned, as the scale interpose a barrier to the radiation of the heat, and also separates the water from the iron.

THE FAURE ELECTRIC ACCUMULATOR.—The Faure secondary battery, or electric accumulator, consists of plates of lead, coated with red lead, moistened with sulphuric acid. If an electric current from a dynamo-electric machine be sent through one of the Faure batteries for a given period, a remarkable result ensues. Electric energy proportioned to the force and duration of the primary current is stored up in the secondary battery. With this stored up electric energy the secondary battery can be carried about, and held ready for use. It appears that very little loss occurs; the first Faure accumulators ever seen in England were charged in Paris, and sent in that state to Sir W. Thompson in Scotland. It was found that the power afterwards obtained bore a satisfactory ratio to the power expended in charging it. Actual experiment demonstrates that a Faure accumulator, weighing about 300 lbs., will drive a tramcar with forty-six passengers for a journey of two miles. It is, therefore, practicable to run tramcars without either horses or steam engines, each tramcar carrying its own motive power; and by the establishment of a suitable number of stations, fitted with gas or steam engines and dynamo-electric machines, a constant supply of motive power is ready for use. In this way lines of tramcars and even omnibuses could be worked without horses. We may yet see electric cabs plying in the streets, railway companies collecting goods on electrically propelled lurries, and streams of men going to business on electric tricycles; while the nursery governess takes the children out in an electric perambulator, and even babies have electric go-carts for home practice.

COPPERING OF STEEL AND IRON.—The use of cyanides in coppering of steel or iron is both prejudicial to the workman's health, and expensive. M. Weil substitutes for them organic acids or glycerine, which are cheap, and are not decomposed, so that the baths do not require renewal of these matters, but merely a supply of oxide of copper. The coppering is done in three different ways, according to circumstances. (1.) The pieces are immersed in the bath in contact with zinc wires. (2.) Porous vessels containing soda lye are placed in the bath liquid containing the objects to be coppered, and zinc plates in the lye are connected with those objects by means of thick copper wire. The soda lye serves continually, for when it is nearly saturated with zinc oxide it is treated with sulphide of sodium, which regenerates the caustic soda, precipitating zinc white, which may be sold. This method is very suitable for candelabra. (3) A dynamo-electric machine is used under the same conditions. M. Weil's copper-plated articles have fully approved themselves as regards durability, etc.

A NEW MOTOR.—Messrs. Eteve and Lanement, of Paris, have recently invented a new motor, which is reported to have all the advantages of gas engines, without the disadvantages, or those of engines consuming hydro-carbons. It is simple in construction and similar in appearance to an ordinary steam engine, generating at the same time the hydro-carburetted fluid required for its operation. The generation of the hydro-carburetted fluid is effected by forcing air under pressure into a receiver containing a hydrocarbon—such as petroleum for example. An electric spark fires the explosive mixture when in the cylinder of the engine, and the resulting sudden expansion produces a more or less powerful effect, according as the pressure of the air admitted is higher or lower, and the volume of the mixture introduced greater or smaller. The quantity of hydrocarbon used for each stroke of the piston is very small—in fact, only just what is required to render the mixture inflammable. The result is that the generator is very small, and allows of the engine being moved very easily from place to place The engine consists of a cylinder, a frame or base plate with feet, a crank-shaft, connecting-rod, piston-rod, side-bars, and fly-wheel, similar to an ordinary steam engine. A second connecting rod converts the rotary movement of the crank shaft into oscillations of a lever, which, by another connecting rod, gives motion to a second lever, which, by means of a pump, bellows, or other suitable contrivance, draws air and compresses it into an air receiver on which is a valve for limiting the pressure of the air. A pipe conveys the compressed air from the air receiver into a hydrocarbon reservoir, the said compressed air passing to the upper surface of the petroleum therein; a pipe, which goes nearly to the bottom of this reservoir, conveys the petroleum therefrom to the front and back of the piston. A pipe with branches conveys the compressed air from the hydrocarbon reservoir to the inlet slide valve which works on the cylinder face, pierced with ports for the admission of air and petroleum. The exhaust is governed by a separate slide valve. These slide valves may be worked by eccentrics in the usual way, or by other suitable means. A magneto-electric apparatus is driven by the engine, and is connected to an induction bobbin which, by means of suitable commutators on the crank-shaft and connections to exploders at each end of the cylinder, produces electric sparks for exploding the charges of mixed air and hydrocarbons as soon as the proper quantity thereof has been introduced into either end of the cylinder, whereby the usual reciprocating motion of the piston is effected.

UNDERMINING THE CROTON LAKE BRIDGE.—This lodge, which is on the line of the New York city and Northern railroad, is a single track, wrought iron, deck structure in three spans of 160 feet, each with skeleton wrought iron piers or towers springing from blocks of masonry. The water is 30 feet in depth. These towers have four legs, and thus concentrated all the weight upon the four corners of the masonry. This masonry was built twelve years since by another company. It rests below low water upon timber cribs. It was tested by loading with stone before building the iron bridge without showing improper settlement. The erection of the bridge towers and the use of the bridge soon developed the fact that the masonry could not stand the weight upon its corners and it became necessary to rebuild it. The towers being continuous frame works with spreading legs made it practicable to build inside of them a subsidiary wooden tower with perpendicular legs. This was done, the bottom wood sills being placed so as to admit the introduction of eight 20-ton hydraulic jacks. Two minutes work with the jacks lifted the towers and adjoining spans bodily. They were then supported upon 15-inch rolled beams, 200 lbs. to the yard, placed in pairs, resting on the inner side upon timbers distributing the weight upon the masonry and on the outer side on timber supports built up from the original crib work. The defective masonry was then taken out and rebuilt. One-half hour sufficed to raise the structure, throw the weight upon the cross-girders and resume traffic. No train was delayed on its schedule time.

ENORMOUS HOPPER DREDGER.—A new patent hopper dredger of 500 tons, built and engined by Messrs. W. Simons & Co., has been launched complete from their works at Renfrew, Scotland. It is named "Alexandra," and is the property of the Manchester, Sheffield, and Lincolnshire Railway, and has been constructed under the direction of Mr. Sacre, C. E., their engineer. It is the second hopper dredger supplied to them by this firm. This vessel is fitted with twin screws and two sets of separate compound engines, and two boilers of 80 horse-power. Its bucket girder traverses beyond the bow for the purpose of cutting shoals or dry banks, and thus dredge its own flotation down to 25 feet depth of water. It will carry 500 tons of its own dredgings at a speed of seven miles per hour, and on board are fitted steam appliances for mooring, lifting, dredging, traversing, and manœuvering. A duplicate dredger to the above (named "Neptune") has during the last six months of winter weather removed 80,000 tons of soil from Newhaven (Sussex) alone, with eight men, and without barges, punts, or tug steamers. The vacant slip will be re-occupied by a larger hopper dredger for a foreign Government.

THE HORSE POWER OF TURBINES.—The power of water is its weight multiplied by the velocity, and in order to illustrate we will suppose a turbine wheel, working under fifteen feet head, will discharge 3,168 cubic feet of water per minute, and utilize 80 per cent. of the full power of the water. Multiply the cubic feet discharged per minute by $62\frac{1}{2}$, which is the number of pounds each cubic foot of water weighs at the average temperature, and this product by height of head under which the wheels are working, and that product divided by 33,000 pounds, this number of pounds raised one foot in one minute being one-horse power, which will give the full horse-power of 3,168 cubic feet per minute, under fifteen feet head; and as no wheel will produce one hundred per cent., the per centage the wheel in question is known to produce or utilize must be taken as the actual horse-power.

FRICTION OF ENGINES.—A large portion of the friction of engines is the result of tight cylinder packing. In setting out the packing it should be only tight enough to keep the steam from passing. It is best to do this job by degrees, setting out the ring a little and then blocking out the crosshead, and testing by allowing steam in the crane end of the cylinder. When no steam passes, the rings are tight enough. In cylinders that have run for some time it is impossible to make a piston tight without reboring. Care should also be exercised in making a complete revolution of the engine by hand after setting out the rings, to see that the packing does not stick in any of the smaller portions of the cylinder. An engine that requires constant lubrication in the cylinder to prevent "squading," needs attention, as generally the rings will be found too tight, or the cylinder out of line.

STRENGTHENING OF IRON.—Two processes have lately been introduced in Paris for strengthening iron. In one process the piece of iron is raised to a cherry red heat and dipped in a mixture of sulphuric acid and water. In the other process the piece is similarly heated, and quenched in a mixture of one part of turpentine and six parts of water.

SPIEGELEISEN & FERRO-MANGANESE.—It is reported that about 150,000 tons of spiegeleisen and ferro-manganese are used each year in the United States in making Bessemer and open-hearth steel, and it is chiefly imported as metal. It is also said that we have fuel and labor enough to produce this alloy within our own borders from the large manganese deposit in the Southern States which is now sent abroad and returned as ferro-manganese and spiegeleisen.

WRITING ON METALS.—Take half a pound of nitric acid and one ounce muriatic acid. Mix and shake well together, and then it is ready for use. Cover the plate you wish to mark with melted beeswax; when cold write your inscription plainly in the wax clear to the metal with a sharp instrument. Then apply the mixed acids with a feather, carefully filling each letter. Let it remain from one to ten hours, according to the appearance desired, then throw on water, which stops the process, and remove the wax.

ITEMS OF INTEREST.

THE Cleveland Foundrymen's Association have elected H. M. Claflin president for the ensuing year, L. F. Holloway vice president, and C. E. Burke secretary and treasurer. The annual report shows a most favorable condition of affairs.

IN 1834 John Russell established the earliest American cutlery works at Turner's Falls, Mass.; the Ames Manufacturing Co. began their career at Cabotville; Alger, at Boston, cast the first American rifle cannon; Cyrus H. McCormick, of Virginia, took out his first patent for a machine to cut all kinds of grain; the first Turbine wheel was put in operation in Connecticut, and rubber was first made into clothing at Roxbury. In this same period before 1840, came vulcanized rubber, the cylinder saw, the patent of Burden of Troy, that forecast the iron ocean steamships of to-day; Burden's machine for making horse-shoes, friction matches, salamander safes, close stoves and solid head pins, Dr. Nott's anthracite stoves, improved plows and Colt's revolvers.

THE annual report from the ranching regions of America, just published, shows the outlook for Western cattle growers to be exceedingly flattering. The general average loss of cattle during the winter was 4 per cent., against 9 per cent. during the winter of 1880 and 1881. The southwest shipments this year will exceed last year by fully 10 per cent. Texas will send at least 20 per cent. more. Gratifying progress has been made in the introduction of improved blood, and breeders of fine stock are enjoying a big boom.

THE Massachusetts Legislature has passed a bill constituting the railroad commissioners a tribunal to decide upon the exigency of proposed railways before they are constructed.

THE Pennsylvania Railroad perhaps has the greatest number of heavy locomotives, and has several of extraordinary weight. One of its fast passenger engines weighs 46 tons, and one has just been built weighing 60 tons, making it the largest engine in this country and hardly exceeded, if equaled, in any other country. The average passenger engine now costs from $10,000 to $12,000, and the heaviest engines cost perhaps $14,000 to $15,000.

SHIPMENTS of Lake Superior iron ore have commenced two weeks earlier from Escanaba than last year, when the first shipment was for the week ending May 11th.

THERE are eighteen steel works in Russia; in seven of these the Bessemer apparatus is used, the others adopting the Siemens-Martin process. The works produce per annum about 82,500 tons ingot steel, and 50,000 tons of steel rails.

IT is held by the Secretary of the Treasury that the Scotch yacht "Madge" which came over here and had such a succession of victories must pay duty if sold in this country. In view of the intention to build other yachts after her model it is suggested that, as with Barnum's Jumbo, affidavits should be furnished of her being secured for breeding purposes.

THE importation of fruits this year is thus far vastly in excess of any previous year, and shows a value of $4,383,086, with a duty of $762,376.90. Of bunches of bananas there have been 1,101,088; number of oranges, 280,837,632; barrels of limes, 1,865; number of lemons, 283,879,530; and number of packages of grapes, 57,100. The number of cocoanuts is 11,378,829.

SICILY can lay claim to having erected the most elevated inhabited structure in the world. It is an astronomical observatory, erected the past year, near the summit of Mt. Etna, and stands 9,200 feet above the level of the sea, which makes it 1,000 feet higher than the heretofore highest building, the famous Hospice of the great St. Bernard.

THE Bessemer Steel Works at Homestead has issued an order prohibiting all Sunday work hereafter. The cupola bottoms will be dropped on Saturdap mornings and the blast let on at four Monday mornings. All repairing must be done on Saturday.

THE quantity of all kinds of foreign and domestic wool taken for consumption in the United States in the year 1880 was, in round numbers, 300,000,000 pounds, against a little over 200,000,000 in 1870, and 125,000,000 in 1860.

TIN AND INPORTATIONS.—Tin constitutes one of the products for which Great Britain was earliest famous. Although it is found in every household in the civilized world, it is estimated that the entire annual product of the world does not exceed 20,000 tons. The importation of tin into the United States has greatly increased during the past ten years, or since the establishment of the vast commerce in hermetically sealed fruits, vegetables, meat and fish. The story of a tin can is one of peculiar interest, not that there is any beauty in the article, but owing to its important position in the export trade of this country. There is but one ore of tin of any importance; and it is called tinstone, and is of various colors. The "dressing" of tin obtained from the mine is a difficult and delicate operation. It requires to be stamped to a very fine powder by peculiar machinery before the metallic particles can be effectually separated; and out of a ton of ore taken from the mine, not more than ten pounds of the metal is sometimes obtained, so small, comparatively, is the valuable portion. The tin undergoes a number of purifying processes before the pure tin is obtained. Pure tin, we are told, could not be used for the numerous purposes to which the tin of commerce is applied; and, therefore, it should be understood that tin plates, such as are used for manufacturing household utensils, is a very thin sheet of iron, coated over with tin, by inserting the iron in a bath of liquid tin. Pure tin is very soft. Therefore it is that tin-plate is named tin as it imparts character to the article and renders it valuable. The manufacturer finds his tin packed in bundles, but the Government has kept its argus-eye on the shining metal from the very moment that it has finished its ocean voyage until it is parted with under promise that it is to be used in manufactures.—Boston Com. Bulletin.

HOW TO FIND A FLAW IN FORGING.—It is well-known that in working iron, such as welding two pieces together, and even in its manufacture, hollow places or flaws occur, with merely an outside skin over the defective parts, which any test but a destructive one would fail to discover. Nor would it be difficult to point out numerous examples of disaster thus occurring. To test the homogeneity of the metal, says the Scientific American, a bar of iron is placed on the equatorial line. A compass, with a very sensitive needle, is passed along in front of the bar, the needle of course, pointing at a right angle to it. If the bar is perfectly solid through its whole length, the needle will remain steady. If, however, there should be a flaw or hollow place in the bar, the needle will be deflected as it passes from the solid to the hollow place, backward toward the solid iron; passing on over the hollow place, the needle will come within the range of the solid iron at the other end of the flaw, and will again be deflected forward. If the bar be cut through anywhere between these two points of deflection, a flaw will invariably be found. Many thousands of pieces of iron—some prepared for the purpose of testing this method of trial, others in the ordinary course of business—have been operated upon with the same unvarying result.

A NOVEL method of taking lumber from the river has been put into practical operation by the Hannibal (Mo.) Transfer Company. The scheme is to run flat cars down the river bank and out on the bed of the river for a distance of 200 feet, and cribs of lumber are then floated on top of the flat cars and drawn out by two engines upon the bank. The cribs are 32 feet long by 16 feet wide, and contain 10,000 feet of lumber. They are then removed to the yards of the company and taken apart, the boards being washed by hydrant water clear of the sediment dirt which attaches as they come down the river. The method will have the effect of making it possible to handle several times the amount of lumber shipped in former years. Twenty new cars, each capable of sustaining the enormous weight of sixty thousand pounds, have been made for the special use of the company, and powerful engines are to be ordered for the purpose of drawing out the lumber.

THE Zion's co-operative Store, Salt Lake City, has a factory attached where there were made by machinery 32,503 pairs of boots and shoes during the past four months. About $6,000 worth of machinery has recently been put into the establishment.

A TRIP from New York to Liverpool made in ten or twelve days was formerly regarded as a moderately rapid passage. The steamship Alaska, of the Guion Line, made her recent trip from Liverpool to New York in 7 days, 13 hours and 51 minutes actual time, beating by 17 minutes the fastest time on record. Her best day's run while out was 419 miles.

THE *Bulletin* states that protection is neutralized by cheap ocean freights.

THE WORLD'S WORK.

We publish under this heading inventions and improvements of a business character; also accounts of various industries.

The Providence Windlasses and Capstans.

PROVIDENCE, R. I.

Eighteen hundred and fifty-seven—eighteen hundred and eighty-two. Between these two dates is marked a revolution on ship-board. The old-fashioned capstan, with its bars and toggles, its rachets and its gearings has passed away, and the mind that invented this admirable series of designs at Providence was the layer out and sexton of the dead. Let us hope the corpse was not embalmed. The old capstan had its day, and it followed the ancient windlass of our grandfathers down to a date antecedent to the time of Paul when he "took ship for Troas." The American people are the quickest witted in the world to catch the advantages of a new and useful idea. And on the other hand, all the advertising in the world will not bolster a humbug.

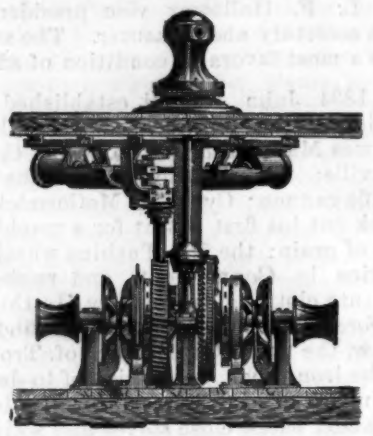
Now what has the American Ship Windlass Company done that it is said to have revolutionized the field it came to occupy? It is to the answer of this question this article is dedicated. We shall speak more particularly of the steam windlass. The old method of handling the hawsers, anchors and chains was by the capstan and bar system. The bars were inserted and manned each by one, or two, or three, the almost interminable winding commenced, and was contiuued until the result desired was reached. Those familiar with the old dog trot of the pall, as it clink, clink, clinked, will recall the metallic ring, and the measured tread of the men, and the slow rising of the anchor chain, or the incoming of the "taut" hawser. It was not only labor for the men, but it was downright hard work; and work that cost a great deal of money because it consumed a great deal of the time of the hands employed. When the Providence Company entered the field, their first effort was to reduce the amount of applied force required, which in itself was a great saving, and, second, to accelerate the speed of the chain or hawser. So great was their success in both these directions that vessels, both steam and sailing, which had been using the "Coffin & Woodward," the "Perley," the "Hyde," the "Globe Iron Works," the "Harfield," (English) the "Wood" and other patents, abandoned them and replaced them with these new designs of the Providence Company. The next step in the line of advance was to adopt steam as the running or motive power, and thus do away entirely with manual labor in the performance of the required work. On the 17th of February, 1874, the first patent carrying steam application was granted. This patent was followed by improvements dated October 13, 1874; October 26 and November 30, 1875; March 21 and April 18, 1876; March 27, November 13, and December 18, 1877; June 25, December 3 and 17, 1878; June 1, 1880; February 8 and 15, 1881. We mention the dates and number of these patents in order to show the experience required in perfecting the Steam Capstan Windlass, as well as to show that every valuable feature, as it was perfected, was covered by the broad aegis of the United States Government. To-day for the merchant marine this Steam Windlass represents the best intellectual and inventive progress in labor and time-saving the world has ever known. We can make no better comparison than that of the ratio of movement between the snail and the race horse. One of the best of windlasses, and so considered by all commanders, before the appearance of the Providence patent, was that made by Coffin & Woodward, of Boston, and to give an idea of how it worked, we quote from a letter of Captain S. P. Griffin, of the Pacific mail steamship "Colon:"

"The Messenger Chain Windlass, which is in this vessel, is a poor, miserable contrivance; is continually getting out of order, is unreliable, and gives no end of trouble. It was made by Coffin & Woodward, of Boston. We are obliged to slack up the chain, fleet it over the wild cats, and are tormented with it, just when we require most that its movements be certain and sure. I would rather have an ordinary hand-power pump-brake windlass than this thing, which, at any rate, is not fit for a vessel of this size, which should have a two cylinder direct steam windlass. The steam windlass on the 'City of Peking,' which I commanded when she was new, was made by the American Ship Windlass Co., of Providence, and it always worked to our satisfaction, never requiring repairs. We want just that style of windlass on this vessel."

As to how it worked on the "City of Peking," we will let our old friend, Lieut. Z. L. Tanner, of the U. S. Navy, gives his testimony under date of April 4, 1880. It is a letter sent to R. S. Osbon, editor of the Nautical Gazette, New York:

"Your favor of the 25th is received. In reply I beg leave to say that the steam windlass in use on the P. M. steamship 'City of Peking,' gave entire satisfaction. It required no repairs during the two years I was in command of that vessel, and was looked upon as thoroughly reliable. It would heave in from ten to eleven fathoms of chain per minute at the speed we usually run it. At this speed it ran smoothly, requiring no attention except occasional oiling."

Ten to eleven fathoms of chain per minute. Think of it, and then compare with the methods of antiquity, which, by the way, have not been improved upon by any other maker outside of the Providence Company.



PROVIDENCE STEAM CAPSTAN WINDLASS.

The application of steam power to the movement of the windlass is seen in the above cut, which describes by its perspicuity the entire operation at a single glance. It makes steam do what it would, under ordinary circumstances, require six to ten men to perform. There is no oath in a steam chest, but there are cords of them in a male's throat, and if any operation can bring them out it is the wind and rewind of an old-fashioned capstan windlass. How many oaths have been kept unuttered by the invention of the Providence Capstan Windlass, the Recording Angel will probably tell us at the last day. The simple opening of a valve is all that is required, and the vessel, no matter whether a mammoth steamship, "Great Eastern" in size, or the little steam yacht "Dragon," must answer the signal, by obeying the tightening of the hawser, under the revolution of the capstan. The idea is carried out in the same manner with the anchor chain, no matter if it be the heaviest or the lightest manufactured. We consider the wonderful mechanism of the Jacquard loom no more important in its resultants, as a labor saver, than the simple mechanism of this easily operated Providence Capstan Windlass, in its wonderful resultants. The latter is just as much an inspiration as the former. The first steam windlass ever put on the Lakes was built by the Providence Company in 1880 for the "Iron Duke," constructed by the Detroit Dry Dock Company. Its success was the theme for newspaper paragraphs all through the Northwest, and thousands of people visited the marvel as the eighth wonder of the world. Its operation was closely criticised by experts who pronounced it all that was claimed. This gave the Providence Company an immediate standing on the Lakes. Last year the "Tacoma" was built at Cleveland by Thos. Quayles Sons, and the Providence Company put a steam capstan and windlass on her. Then followed the "Onoko," the largest steamer on the Lakes, also built last year. She was supplied with one. "Tacoma" having since been sold, a sister steamer was built, and so great was the satisfaction given by the steam windlass and capstan, that the Providence Company has just shipped one to the new steamer. They have lately put a steam windlass on the U. S. Light House steamer "Dahlia" at Detroit, and many other revenue marine, light house, coast survey, and iron-clad steamers of the navy. Indeed, the fact that these steam windlasses are endorsed by the United States Government, and that they are being put on the national vessels is proof that their merits are all that is claimed for them; for the alembic of a trio of government officials is a crucible that burns out nine-tenths of all the devices submitted for official inspection. But this device is above criticism. Captain Joseph Irish late commander of U. S. Revenue steamer "Alexander Hamilton," in speaking of the Providence Capstan and Windlass on his vessel said to us: "There could be nothing better to enter the head of man for this particular use than the windlass made by the Providence Company." What would the good captain say if he saw that same capstan work by steam, and entirely independent of the aid of man? These windlasses are particularly required on all lake and river steamers of the West. The field for their sale on any of these lakes and rivers is simply enormous. For turning, working up to docks or shifting, all that is necessary is the hawser, and instead of the crew with the "ye-ho-ye-ho-a-haw" is the turn of the steam port, and the movement of the giant or lilliputian craft. They ought to be everywhere. They cost but little, and pay for themselves in a year's use. They save time and money, preserve the temper, and render more pleasant the arduous duties of him who "goes down to the sea in ships." The mechanism is of the simplest character, it requires no skill to work, and it cannot get out of repair. They have been put on the largest steamships afloat, and after years of use, the only expense has been the cost of lubricating oil. Can any device have a greater or more critical following? The commander is not living who speaks but volumes in its praise. They are adapted to yachts as well as larger vessels, for they are made in several sizes and styles. We cannot close this article without appending the following from the Nautical Gazette.

"The yacht building at East Boston, Mass., by D. J. Lawlor for Mr. Weld, of Boston, is to have a Providence Iron Pump Brake Windlass, with patent Iron Side Bitts, the same as put on yacht Actea, two years ago.

The shipbuilding at Damariscotta by E. Haggett & Co. is to have a No. 10 Providence Capstan Windlass.

The schooner of about 350 tons building by Smith & Townsend, at East Boston, is to have a Providence Iron Pump Brake Windlass and Patent Iron Bitts.

The U. S. States Fish Commissioners' steamer Albatross, building by Pusey & Jones Co., at Wilmington, Del., is to have, among other improvements, for the saving of labor, a "Providence" steam Capstan Windlass, which is becoming so popular in the Revenue, Light House and Coast survey service.

The schooner building by D. D. Kelly & Son, at East Boston, Mass., is to have the "Providence" Patent Capstan Windlass.

The schooner building by Goss, Sawyer & Packard for Mr. Church and others, of New Bedford, Mass., at Bath, Me., will handle her anchors and chains with a "Providence Pump Brake Windlass.

The steamer A. J. Wright, at Buffalo, N. Y., will take out her iron Windlass and put a "Providence" Capstan Windlass in its place, and the bark Sarah, of Boston, Mass, is now putting in a "Providence" Windlass in place of a wood windlass.

The schooner about starting at New Haven, by Henry Sutton and others, will put on a "Providence" Pump Brake Windlass, the same as in the schooners E. M. Reed, Orville Horwitz, Harry A. Barry, James Boyce, and many others of the New Haven fleet."

Certainly no more proof is needed to convince the most sceptical that this windlass is the only device guaranteed to give good service, and the only one sure to give satisfaction to the most exacting owner.

Mr. Frank S. Manton is the agent of the American Ship Windlass Company, with office at Providence, R. I. Circulars will be mailed upon application to him.

Angostura Bitters.

Dr. J. G. B. Siegert & Sons' Angostura Bitters has the field against all competition. No business has had more competition. Since the foundation of this world-renowned house (the sole manufacture of the genuine "Angostura") it is an easy task to count at least six hundred classes of bitters, which have come up like the flower and have been cut down. Every one remembers two prominent bitters, that we do not care to advertise by naming. The proprietors rushed into print, expended two or three fortunes in advertising and retired richer than when they entered the business. They came, they went away, and are now on the road to oblivion. Not so with the Angostura bitters. It came to stay, and as proof it has been before the public fifty years, and is known as the standard bitters. It is tonic, invigorating, non-intoxicating, a cure for dyspepsia, diarrhœa, fever and ague and indigestion. It was awarded the highest honors at Philadelphia, Paris and Vienna, and its sales are colossal. No summer disease can attack where they are used. The American agency is now in the hands of J. W. Wuppermann, 51 Broadway, New York, who succeeds J. W. Hancox. These bitters come in small packages and are a necessity to those who know of their curative and appetizing qualities. Like all sucessful articles they have their counterfeits which it is well to be on the look out for. Such goods should be bought only from responsible establishments.

Ellwanger & Barry's Mount Hope Nurseries, Rochester, N. Y.

Messrs. Ellwanger & Barry by a judicious course in the furtherance of their nursery business have built up a trade extending to all parts of the United States and to all parts of the world where trees are cultivated for profit and pleasure. They are both experienced and capable men, always experimenting and giving the public the benefit after reducing them to an absolute certainty. So that one is not surprised when they say "We offer many novelties," alluding to new fruit and ornamental trees, shrubs and roses, also to various other branches of their business. Doubtless the entire nursery business is honeycombed with unsubstantial and unreliable men, and it is a satisfaction to know

that Messrs. Ellwanger & Barry are prepared to substantiate the positive merits of their growth. Another feature in their favor is that their long list of customers extends to nearly all parts of the world, proving that in their dealings they not only have the support of their customers, but that in their methods they adopt the plan of fair prices for only the best quality of stock. They have recently issued a new abridged catalogue, which is mailed free of all charge to any person applying. A visit to their nurseries would be a day expended in solid pleasure and enjoyment.

Casting Big Propellers.

The important work of manufacturing the huge brass propellers that are used on the large steamers of our navy is carried on exclusively in the navy yard, Washington, where the propellers of all the principal steamers in the navy are made. The method of constructing these mammoth pieces of machinery is interesting. Only the most skilled and reliable workmen are entrusted with their construction, for the slightest mistake or carelessness on the part of a single workman, during any stage of the work, would spoil the whole job, and cause the Government a heavy loss.

A propeller, such as is used on naval vessels, consists of four large oval blades, the smaller ends of which are connected with a heavy hub, which forms the centre, and which is made to fit on the screw of the steamer in the manner of a wheel on an axle. Propellers are, of course, of different sizes, the larger ones measuring twenty feet in diameter and weighing several tons. They are made in the large building known as the foundry, which comes under the bureau of steam engineering, of which Chief Engineer William H. Shock, of the navy, is chief, and Mr. George Wilson, boss. To give the propeller the great strength it requires, it is not cast in sections, but in one piece, and its large size is what makes the job so difficult.

There is in the centre of the shop a large circular pit, which, when a propeller is to be cast, is filled with a preparation of fine sand loam and other porous substances, in which the pattern or model of the propeller is placed and covered with the loam. A gang of men is set to work ramming the loam on the pattern for hours, until it becomes solid. Then the pattern is removed, and a perfect impression of it is found left in the loam. Several tons of brass are then placed in an immense cupola in layers, there being between each layer of brass a layer of hard coal and some wood on the bottom to ignite the coal. The wood is ignited, and by means of a revolving fan the coal is made to burn vigorously, and in an hour's time the brass commences to melt. Being heavier than the coal it sinks to the bottom of the cupola, and is drawn off through an opening in the bottom, being thus separated from the coal and cinders which accumulate on the top.

The metal is drawn off into a large ladle, which is kept heated by burning charcoal. When the metal is all drawn off, the large ladle contains several tons of molten brass, and the workmen are ready to "pour." The pouring, which is generally done in the afternoon, is the most interesting and particular part of the operation. The large ladle, which contains the molten brass, is hoisted by means of a crane, and hangs suspended in mid-air, directly over the pot which contains the mould. Every man is at his post, and has to work with the unerring regularity of a machine, for the slightest variation would spoil the job, and most likely cause a serious accident. The metal is slowly poured through an opening (which is left for that purpose) in the mould until it is filled.

Several pieces of gas-pipe are stuck in different parts of the mould to give vent to the gases, and after all the metal is poured a large jet of flame, fed by the gas from the mould, burns for ten or fifteen minutes. Then nothing more is done until the following day, when the sand is shoveled off the propeller, and it is hoisted out the mould by means of the crane. The rough surface is somewhat smoothed, and if it is to be used for a ship that is being built or repaired at another yard, it is hauled down to the dock, put aboard of the "Tallapoosa," and taken to its destination.

Welding Nickel with Iron.

The great value of nickel as a coating for iron has led to experiments to see if it could be applied to the surface of sheet and wire iron by some mechanical means, in place of the usual electro-plating process. The experiments appear to be so far successful that both nickel and cobalt have been welded to iron, and the united metals have been afterwards stamped and rolled into various shapes such as plates, kettles and kitchen utensils, and drawn into wire having an iron core covered by a nickel or cobalt skin. Alloys of nickel also have been made, and these alloys have been used to weld with iron. Cobalt alloyed with zinc also has been welded with iron. In all these experiments it appears to be essential, that, during the welding under the hammer or rolls, the air must be excluded. This has been done by wrapping the iron and nickel, before welding, in thin sheets of iron. The iron skin was welded on at the same time, but was removed afterwards by dissolving the outer skin of iron in acids, the nickel surface under it not being affected by the acids. Another method used to exclude the air during welding is to heat the iron and nickel in an atmosphere of carbonic oxide or carbureted hydrogen. It was also found that pure nickel could be welded over a core composed of an alloy of nickel and copper. The experiments were conducted by Dr. Theodore Fleilman, of Islerhon, Germany, and are regarded as opening a wide field for commercial enterprise in the manufacture of nickel-plated stamped ware and nickel covered wire.

MINES AND MINING.

THE territory of the Chrysolite mine, Leadville, including the old Vulture, the Kit Karson, and other properties, embraces over sixty acres, and only a small portion of it has been worked or explored. Hence the prospects are good, and the possibilities great. During the month of February, the amount of ore mined was 721 tons; amount settled for at the smelter, 837 tons; amount of money received, $32,838.

ALL copper mines are not prosperous. The annual report of the Bridge Copper Company, Mich., for 1881, states that the yield was 101,150 pounds of barrel copper, 80,050 pounds of stamp copper, and 54,540 pounds of mass copper, a total of 235,740 pounds of mineral, realizing $36,-233.99, which, with interest, carried the gross receipts to $36,376.67. The expenditures were $39,496.34, showing a loss on the business of the year of $3,119.67.

ANOTHER "pocket" of silver is said to have been discovered in Silver Islet.

THE Mexican Central Railroad will reach the Durango tin mines during the present year.

THE Mt. Diabel Mine, Nevada, the mining company owning which have a capital of $5,000,000, has produced $430,172, and lately made three shipments aggregating $23,598.

UNUSUAL quantities of ore have been stoped out of the shaft of the Gagnon mine, Butte Company, Montano, per centage of copper as well as iron increasing. It is expected that a large body of rich ore will be found at least as deep as the 400-foot level, in which there will be but little copper and abundance of iron and silver.

THE amount of ore of the Union Consolidated, Nevada, has increased 800 tons per week.

IN the four Arizona mines, known as the Old Dominion copper mines, it is estimated that there are $30,000,000 of ore already in sight. So telegraphs the manager of the Old Dominion Copper Mining Co.

AT the South Horn Silver Mines, Frisco, Utah, the rock now coming out of drift looks like the ledge matter of the Horn Silver Mine, and if Horn Silver is a ledge, the South Horn mines will in a short time be great paying mines.

MESSRS. Wilson & Son and Pimlott & Hall, Coalton, O., have secured the contracts with the I., B. & W. and C., S. & C. roads for all the steam coal used by them for one year, and both firms are making preparations to do a big summer's work. Messrs. Wilson & Son have effected an arrangement by which their coal is delivered on the tipple by the ton instead of the old method of hiring drivers by the day. This is a new departure for the valley, and is proving eminently successful, and the probabilities are that the other mines will adopt the same plan. The Indiana, Bloomington and Western road is extending its line of road, as is also the T., C. & St. L., and by the beginning of next winter's business it is hoped that facilities will be afforded for transportation of all the coal that can be mined. The M. & C. road is also reaching out into this section, their line to reach as far as the works of the Comet and Center Valley Coal Companies.

TO TEMPER LARGE CURVED DIES.—Fill the holes with fine clay and wire to keep dies in place. Heat evenly and slowly in a furnace. Lift the dies from the furnace with the face vertically into water heated to about 50 degrees and containing about one-fourth pound salt per gallon. Hold them still at the bottom of the water until cooled.

TO BEND A WROUGHT IRON PIPE.—Fill it with melted resin. When the resin hardens, bend the pipe, and it will retain its round form. Remove the resin by melting.

TO WELD STEEL WITH LIME.—Try spent lime, air slacked, and use it just the same as borax.

AN exchange says it ought to be made generally known that flour is probably the best article to throw over a fire caused by the spilling and igniting of kerosene.

RAILROADS AND TRAFFIC.

THE control of the Cincinnati, Hamilton and Dayton has been purchased jointly by the New York, Lake Erie & Western, and the New York, Chicago and St. Louis roads, to afford them both an independent outlet to Cincinnati and Indianapolis.

THE Pittsburgh & Western road is rapidly crystalizing into shape for extended business, and within three months trains will be running, it is said, on the extension from New Castle Junction, Pa., to Akron, O.

THE Columbus & Eastern railroad company will build a new road to the coal fields of the Hocking, O., region, to run from Columbus, O., twenty-one miles to Millersport, thence to Thornville, Glenford, Chalfront, Mount Perry, Fultonham, Saltillo, Rehoboth, New Lexington and Wahahala, and terminating at Buckingham, a distance of sixty-two miles, nearly twenty-miles shorter than by the route of the Ohio Central to the same place.

THE report of the Atchison, Topeka & Santa Fe company for the year 1881 shows a continuance of a remarkably successful career. It is but a short time since the road consisted of a single line ending on the plains of Kansas, and four years ago its gross earnings were only $2,679,000. Now the company operates over 2,200 miles of road, including 441 miles leased, and its earnings last year upon the lines owned reached the large sum of $12,555,000, averaging no less than $7,422 per mile. Its net earnings were $4,546,682, and after paying fixed charges and three dividends amounting to 5½ per cent., there was a surplus for the year of $1,132,072, which added to the balance from the previous year makes the total balance of income account $4,154,482.

THE Pittsburgh, Cleveland & Toledo Railroad Company, with a capital of $2,900,000, has filed articles of incorporation with the Secretary of State for Ohio. One terminus will be in Poland, Mahoning Co., Ohio, and the other at Pike Station, Wayne Co., O.

A SPECIAL train has arrived at Springfield over the new road of the Indiana, Bloomington & Western railroad through the counties of Mahoning, Trumbull, Portage, Summit and Medina, and into the county of Wayne, O. The incorporators are William J. McKinnie, George J. Margerum, William J. Hitchcock, Lucius E. Cochran and William C. Agnew.

THE Pittsburgh and western manager of the new line from Pittsburgh to Akron states that it will be open in three months.

THE "Overland Railroad Construction Company" has been incorporated under the laws of New Jersey, upon a proposed capital of $150,000,000 mortgage bonds and $150,-000,000 in shares, to construct a railroad from the Atlantic to the Pacific.

THE track of the Wheeling and Lake Erie has reached Fremont, O., about 16 miles beyond Bellevue, the last point named, completing 80 miles. It will be pushed rapidly on to Toledo.

THE Toledo, Cincinnati & St. Louis, of which 110 miles remain to be completed, is expected to be in operation by August 1st.

Surveys are being made for a short branch from Ohio Central to the city of Newark, O. It will be about three miles long.

ARRANGEMENTS have been completed for the running of trains over the St. Clairsville & Northern on which the track has been laid some time. It is four miles long, from St. Clairsville, O., to a connection with the Cleveland, Tuscarawas Valley & Wheeling road.

CONNOTTON is still in statu quo, and not even the certainty of the endorsement of the new plan by the bondholders serves to elevate the stock, which is around at 6¾.

A CERTIFICATE of incorporation of the Columbus & Cincinnati Railroad Co. has been filed with the Secretary of State of Ohio. The capital stock is $2,000,000, and the incorporators are Daniel McLean, M. J. Williams, Milt Gardner, M. Pavey, J. D. Stuckey, C. A. Palmer, George Melvin C. H. Brownell, Charles M. Stimson, James Pursell, and M. Willard. The termini are Columbus and the intersection with the Marietta and Cincinnati road in Clinton county, between New Lexington, in Highland county, and Clinton Valley station, Clinton county, passing through Franklin, Madison, Fayette, and Clinton counties.

THERE has been a decline of railway stocks in the New York market, these including Erie and Wabash. The report of the Wabash shows that it failed to earn its fixed charges in 1881, falling short $1,500,000; and that, with increased obligations, the deficit is likely to be upward of $2,000,000 the present year.

CINCINNATI, Sandusky & Cleveland shares have advanced from 24 to 27⅞.

MARKETS.

FINANCIAL.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, May 12.

Money has been easier, with a less active demand. The rate of discount is 7@8 per cent. Money is obtained on prime collaterals at 5 per cent. on call and 6 per cent. on specific time. Eastern Exchange is in good demand, and rates are slightly easier. Local securities are generally strong and close firm.

IRON.

Prices for pig iron continue weak, and few large sales are effected without concessions. New orders, however, are slow in coming in, and this state of affairs must lead to stocks accumulating. There is not the same active inquiry for finished iron. A lower range of prices cannot fail to lead to decreased production. Gray Forge owes its present relatively high quotation to the moderateness of supplies. There have been limited arrivals of foreign iron, with moderate transactions. English No. 3 is being sold at $20.50@21, and No. 1 at $23@23.50. In muck bar a moderate business has been done; the sales have been at from $42 at mill to $42.50 in the general market. On the following quotations for blooms buyers obtain concessions. Charcoal Blooms, $75; Runout Anthracite $62.50@65; Scrap Blooms, $55, and Northern Ore Blooms, $50. Prices of bar iron have declined. There is more activity in plate and tank iron. We quote 3c for Tank and Ship Plate; 3.5c for Shell; 3.75c for Refined; 4.75@5c for Flange; and 5.75c@6c for Fire-box. Prices of Sheet-iron are lower. We quote Common Sheet, No. 27 and 28, 5.5c.; best Bloom, No. 26 to 28, 7c; common red plates, 3-16@16 3.5c; blue annealed 3-16 to 16 3.8c. A fair business is being done in structural iron. We quote angles 3c; Beams, 4c; Tees, 4c; and Channels, 4.2c. A good business has been done in steel rails, which are to be obtained in large lots at about $50, and in smaller lots at $52@$54.

CINCINNATI—Reported by E. L. Harper & Co — The market continues about the same as reported last week. We note the sale of several round lots of neutral No. 1 mill iron at a concession in price.

CINCINNATI--(Reported by Rogers, Brown & Co.) The market has been fairly active since last report at prices representing no further decline. Several sales were made of mill and foundry grades for delivery extending as far as October. A canvass of the Southern iron producing districts reveals a situation that must materially influence the future of the market. The large coke furnaces, almost without exception, are entirely without stocks, and have orders booked that will take the bulk of their product for several months to come. A few large orders, taken at the decline, have developed more stiffness among them, and bids for round lots at under prices are met with prompt refusal. Labor troubles at the Pratt coal mines near Birmingham threaten a coke famine and corresponding curtailment of production. A company was formed at Birmingham during the week for the erection of a blast furnace to make car wheel iron. Stocks of this class of metal are accumulating a little at the Alabama furnaces, and the market for it is still sluggish. Central Ohio irons are in fair demand, and stocks are not increasing. We make no change in prices.

LEAD.

The market has remained quiet, and we quote $4 90@4 95 for carload lots delivered in Boston and in a jobbing way at 5¼@5¾c. Manufacturers' prices are unchanged. We quote: bar, 6½c; pipe, 7¼c; sheet, 8c; tinned lined pipe 15c; tin pipe, 35c. All less ten per cent.

COPPER.

Copper has been rendered steady by odd lots being bought up by the Lake miners. Some small outside lots have been bought at prices fractionally below 18c. The purchases were made, it is affirmed, by the companies, and there now is no Lake ingot on the market at less than 18c in a large way, and brokers quote 18@18¼c. Baltimore can be bought in a large way at 17¾c. The companies are, as is proven by their action, trying to keep the price of lake at not under 18c. The jobbing price of Lake is 18¼@18 per cask and of Baltimore 17¾@18c per cask. The combination prices of manufactured copper are unchanged. We quote: Sheathing, 28c; Braziers', 30c@32c; Bolt 30c; Copper bottoms, 31@32c; American yellow sheathing metal, 20c.; y. m. bolt, 22c; English yellow sheathing metal, 16c in bond.

TIN AND TIN PLATES.

Business moderate. We quote Straits 22¼@22½c. The decline in the London market, in which a sharp fall has occurred, reacts on prices here. The stock of tin in the United States at the commencement of this month, was 1,850 tons. Tin plates have improved owing to lowering of stocks. We quote for larger lots: ordinary brands ✠ box, Charcoal Bright, $5.87½@6 25; ditto Ternes, $5.25@$5.50; Coke Tin, $5.10@$5.25, and ditto Ternes, $5.12½@$5.25.

COAL.

There are considerable deliveries on contract orders. A number of vessel cargoes have been dispatched. Lower freights are looked for. There is somewhat less firmness in circular rates.

HARDWARE.

A good trade is being done, especially with builders' requisites, furnishing iron-mongery, locks and keys, and also carpenter's tools, hoes, rakes, spades and shovels. Tinned and enamelled hollow-ware, japanned iron plate-goods, cutlery, and brassfounders' fittings for lavatory and other purposes, door and window fastenings, &c., are all in good request. The Carriage and Wagon Axle Manufacturers' Association have confirmed existing prices. Sales of nails have improved; we quote 10d. to 6d., $3 30 per keg, net, in small or large lot. The Clothes Wringers' Manufacturers' Association has advanced the price of licensed clothes wringers $3 per dozen to take effect immediately.

LUMBER.

Great confidence in the future prevails among our lumber dealers. Trade is all that could be expected. Considerable lumber has arrived the past week. Building, on which the chief dependence is placed for sales, promises to be active throughout the season. Prices are generally held to the lists. Cedar shingles are scarce, and in good demand, and spruce clapboards are in excellent request. In hard woods mahogany sells readily, and for choice selections of American walnut and other prime furniture woods, higher prices than those of our quotations are realized without difficulty.

WOOL.

Prices continue to be well sustained in the Eastern markets, though as the new wool arrives they may be expected somewhat to decline. For washed fleeces we quote: Ohio XX, 42@44c; do., X, 41@43c; do. No. 1, 44@46c. Washed Ohio fine delaine brings 44@46c.; Ohio, unwashed, commands 48@30c.

LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2	$50
A 3	40
B	32
C	22
D	16
E	13

1¼ and 1½ inch.

A 1 and 2	$48
A 3	40
B select	32
C	22
D	16
E	13

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	22
D	16
E	13

STOCK BOARDS.
12 Inches wide.

A 1 and 2	$45
A 3	38
B	32
C	24
D	16

STRIPS.
6 Inches wide.

A 1 and 2	$42
B	35
C	25
D	18
E	14
Norway Fencing Strips	18
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	38
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$16
18 feet and under	$17
Timber, larger than 8x8 special.	
Timber, longer than 18 feet, adds about $1 per foot per M. extra.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 50
Lath	3 00

Surfacing, one side, adds $1.50; two sides $2. Matching, flooring and drop siding, $2.50.

FOUR NEW PORTABLE
Thrashing Machines
To close out large stock.
For particulars address
FULTON IRON & ENGINE WORKS,
DETROIT, MICH.

THE MORGAN
Variable Blast Water Tuyere Iron.
With the front plate removed, showing the rotating air tubes through which four different currents of air may be passed thereby making any sized fire from two to eighteen in. diameter.

I. actually saves one-half of the coal; makes an intense heat just where it is needed, and burns no coal unnecessarily Always gives a centre blast, and cleans all the dirt from the fire. Supplies hot water We also furnish a Tuyere on same principle without Water Attachment. All goods guaranteed to please or no sale. Catalogue sent free. Address, A. W. MORGAN & CO. 52 Vance Block, Indianapolis, Ind.

FOR SALE.
Heavy Punch or Shears.
Used for punching Railroad Fish Plates. Punches four holes at a time. Weight over Five tons. Good as new. Address
NATIONAL MACHINERY CO.
Cor. Superior and Bond Streets.

JOHN SHAW & CO.,
Brass Founders,
Manufacturers of
All Kinds of Brass & Metal Castings
FOR PATTERNS, &C.
92 St. Clair Street, TOLEDO, O.

W. L. COTTRELL & CO.,
PATTERN AND MODEL MAKERS.
Personal attention given to all work, and satisfaction guaranteed.
53 Centre Street, Cleveland, O.
☞ Correspondence solicited.
W. L. COTTRELL. S. T. JULL.

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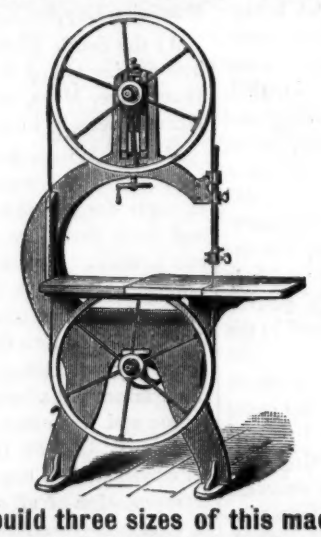
SMITH & OLWELL,
General Machinists,
Manufacturers of
STEAM ENGINES.
(STATIONARY AND MARINE,)
and Machinery of all descriptions.
116 Elm Street, Cleveland, O.
☞ Special attention given to Marine jobbing.

M. D. COWDEN,
Successor to
G. W. FRENCH,
Manufacturer of Machine, Architectural and Ornamental
PATTERNS,
Patent Office Models, &c.
☞ CONTRACT WORK A SPECIALTY.
59 Center Street, Cleveland, O.

A. NORTHROP & CO.,
NORTHROP'S PATENT CAP SEAM
SHEET IRON ROOFING.
PATENT
PANELED SHEET IRON CEILING,
And CRIMPED IRONS of various designs for Roofing and Siding.
No. 97 First Avenue,
PITTSBURGH, PA.
☞ Send for Circular.

Eureka Band Saw.



We build three sizes of this machine
with 26, 30 and 38 inch wheels.
The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.
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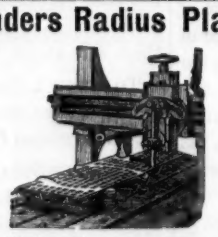
Manufacturers of
WOOD WORKING MACHINERY,
176 Terrace Street, BUFFALO, N. Y.

Flanders Radius Planer.



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L. B. FLANDERS MACHINE WORKS,
PEDRICK & AYER, PROP'RS,
1025 Hamilton Street, Philadelphia, Pa.
New Descriptive Circular on application.

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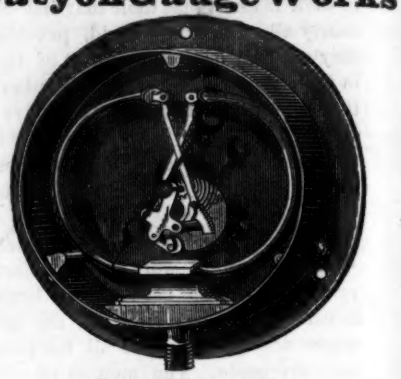

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Manufacturer of the
Bourdon and Ashcroft Gauge,
ALSO, BAYLEY'S
IMPROVED DUPLEX GAUGE,
Specially adapted for Locomotives.
32 North Jefferson Street,
DAYTON, OHIO.
All kinds of Gauges repaired at short notice.

HOLLAND & THOMPSON
Troy, New York,
Manufacturers of the
Holland Lubricator,
for lubricating the Valves & Cylinders of Steam Engines.

Operating with downward visible drop. The principle of this Lubricant is entirely new; being the only one manufactured operating with a downward visible drop, and does not conflict with any other patented Lubricator, being protected with Letters Patent, granted July 5, 1881.
☞ A saving of from 50 to 90 per cent in cost of oils. Send for Circular.

M. GAUNT,
Manufacturer of
AUGERS AND MACHINE BITS,
All goods manufactured at my establishment are guaranted A1.
Factory—22 East South Street.
INDIANAPOLIS, IND.

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Twenty-nine Hundred Seventy-seven
2977 MACHINES 2977
NEW & SECOND-HAND
comprising
Machine and Blacksmith Tools of every description. Woodworking Machinery in all its Branches, Portable Engines, Upright and Horizontal Stationary Engines, 1 to 300 horse power, Locomotive Fire-box, Upright Boilers, 1 to 100 horse power, Waterwheels, Cotton and Woolen Machinery, Steam Pumps, Grist Mill Machinery, &c., &c., &c.
S. C. F. & CO.
Fully described, with prices annexed, in our List 28. Send stamp for same, stating what you want.
☞ We have the largest assortment of Machinery to be found in the hands of any firm in the country. ☜
Works and Main Office,
Manchester, N. H.
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THE MILLER CO.
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THE TORRENT AND UNIQUE INDEPENDENT BOILER FEED
Steam Pumps,
Canton, Ohio.
For Boilers of from 5 to 150 H.P., with Base, or Bracket on smaller sizes! Price $30 and upwards. Small sizes indispensable for Farm and traction engines. Also make a specialty of all kinds of castings. Send for new 1882 Catalogue.

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Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's	per doz	$16 80
Ship	" "	18 75
Heavy railroad	" "	19 50

Axes.

Hunt's	℔ doz	$ 9 50
Lippincott's Crown	℔ doz	9 00
Cut More	℔ doz	9 00
Peck's Double Bit	℔ doz	22 00
" Champion Blade	℔ doz	11 00

Anvils.

Eagle, Amer.	per lb. 10c dis 15
Wright's	11½c@12c
Armitage's Mouse Hole	9¼@9¾c
Trenton	10½c
Wilkinson's	10c

Animal Pokes.

Berea, per doz	4 00
Eagle, per doz	5 00

Apple Parers.

Domestic & Reading	℔ doz $7 50
Turn Table	5 00

Cleveland Stamped Elbows

Genuine Russia Iron

4	inch	per doz	4 50
4½	do	do	5 50
5	do	do	7 50
5½	do	do	8 50
6	do	do	9 50
7	do	do	11 00

Planished American Russia Iron

4	inch,	per doz	4 00
4½	do	do	5 00
5	do	do	6 50
5½	do	do	7 50
6	do	do	8 50
7	do	do	9 50

Charcoal Iron

4	inch,	per doz	2 00
¼	do	do	2 50
5	do	do	3 50
5½	do	do	4 00
6	do	do	4 50
7	do	do	5 50

25 per cent

Augurs and Bits.

	Dis
C S cut augurs	40@10
do do do bits	40@10
D C gimlet do	$6.00 Gross
Snells	@40
Russell Jennings'	10 10@10
Cook's pat augur	40@10@50
Post hole, net ℔ doz	$21@24

Balances.

Dis

stillon's, Frary's, Morton's 15 10 per ct

Bellows.

Dis

Blacksmith's com new list, 40 ℔ ct
Moulder's new list, dis 40 ℔ cent
Hand, new list, 40 per cent

Bolts.

	Dis
Carriage and tire, com	80
do do Norway	65
Stove	40
Plow	30
Wagon	40
Machine & Square head	55
Skein,	55
Bolt ends,	55
Lag,	55
Tap,	55

Butts.

	Dis
Wrought brass	65&10
Cast, loose joint	50&10
Pin, japanned and silver tipped	45&10
Wrought, fast joint narrow	40&10
Wrought fast joint broad	45&10
Wrought loose joint broad	45&10
Wrought table and back flaps	40&10
Loose joint, reversible	45&10
Brass kettles—per lb.	32@35

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6¼	6¼

Crucibles.

Per number	4@ 4½

Clothes Wringers

Keystone per doz	42@45

Chisels.

Hot and cold cutting	℔ lb $ 30
Railroad track	30
Machinists	30
Chipping, mallet head	50
Cape	50
Packing	50
Stone cutters	50

Crowbars.

Steel point	℔ lb 5½
Cast steel	7½

Cutlery, Pocket and Table.

Meriden Cutlery Co, table net
Am. Miller Bros.' Cutlery Co dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co list net
Aaron Berkenshaw's d pocket is 25

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W dis 20&10

Drawing Knives.

Discount.

Witherby's 60@10 ℔ cent
Barton's 15
Adjustable handle 10

Emery.

Genuine Chester	7@ 8
Wellington	10@12

Files.

Auburn $5 to £. dis 35 pr cent
E. M. Boynton's, new list dis 25
J. & Riley Carr 4.50 to £.
Johnson & Bro. dis 30
Butcher's 4.50 to £.
Walter Spencer & Co.'s "Diamond" 4.50 to £.
Fisher's 4.75 to £.
Moss & Gamble 4.50 to £.
H. Disston & Sons (new list) dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson dis 40
New American dis 40
Union File Co dis 40

Grindstones.

Ohio	1¼@1½ ℔ lb
Nova Scotia	1¼@1½ ℔ lb

Hatchets.

Yerkes & Plumb:--Shingling, Nos. 1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos. 1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos. 1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25

Horse Rasps.

Heller's	dis per cent 30
"Arcade"	50 & 20

Harrow Teeth.

Iron ⅝ to 1 inch	per lb 3½c
Steel, square	4¼c

Hammers.

Mason's stone hammers, steel faced and pene	℔ lb 15
Mason's stone hammers, solid cast steel	25
B. S. Napping hammers	30
Striking hammers, solid cast steel, 5 to 25 lb	20
Drilling hammers, solid cast steel, 3 to 6 lb	20
Turning hammers, full polished	each 2 00
Set hammers	℔ lb 35
Creasing hammers	35
Ordinary bush hammers	55

Nails.--BRADS AND FENCE.

10 to 60d	3 40
8 and 9d advance	25
6 and 7d do	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
⅞ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1½ do do do	1 75
1 do do do	2 50
⅞ do do do	3 00
Cut spikes, all sizes	25
Clinch nails, all sizes	1 75
Casing and box nails 75 cts advance	
Finishing nails, $1 25 do	
Tobacco nails, 50 cts do	

Nuts and Washers

	Dis
Nuts	7
Washers	6

Picks.

Railroad, 4 to 5 lbs.	doz $7 75
5 to 6 lbs.	7 75
to 7 lbs.	8 50
7 to 8 lbs.	9 50
Railroad Tamping Pick 7 to 8 lbs.	doz 13 50
Mill Picks per lb	75c

Rivets.

Iron	dis 40
Tinned	dis 40
Copper	dis 33⅓

Squares.

	Dis
Steel or iron, case lots	50
Try squares and T bevels	40

Spikes—WROUGHT

All lengths by ¼ inch	4½c
do do do 5-16	3½
do do do ⅜, 7-16 & ½ in	3¼

Shovels and Spades.

Ames' new list, July 1, 1881,	dis 15
Old Colony	dis 15
Remington's (Lowman's Patent)	dis 30
Rowland's	dis 40 and 10
Griffiths	dis 40&10

Shovels and Tongs.

Iron and Brass Head, R. & E. list	dis 60&2
Polished Steel, new list	dis 50&10&2

Sad Irons.

From 4 to 10 lbs.	per lb 3½ net
Self-Heating	℔ doz $9 net
" Tailors	℔ doz $18 net
Gleason's Shield and Toilet	dis 25
Mrs. Pott's Irons, double pointed	dis 40
Mrs. Pott's Irons, square back	45 dis
Enterprise Star Irons	45 dis
Comoined Fluter and Sad Iron	℔ doz $15, dis 15

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.	dis 20
Stillman's Genuine, per doz $3 50 and $5 50	dis 20
Stillman's Imitation, per doz $3 25	dis 20&10
Common Lever, per doz $2	dis 30&10
Leach's No. 0 $8; No. 1 $15;	dis 15
Hammer, Hotchkiss $5 50, dis 10	
" Bemis & Call Co.'s new patent	dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer	dis 30&5
Bemis & Call Co.'s Plate	dis 10
" " Cross-cut	dis 12½
Aiken's Genuine $13, dis 50&10	
" Imitation $7, dis 50	
Hart's Patent Lever	dis 20
Disston's Circular	dis 40

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co	dis 20
Sciota	dis 25
Bailey's Pat. Adjustable	dis 25

Rules.

Stanley	dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"	42
Simmons' Sash Supporters	20

Hinges.

Champion double acting spring hinges	dis. 30
Screw & Strap 8@12 in.	$6. net
Gravity Locking Blind Hinges, Sargeant & Co.	70&10

Screws. Dis

Flat head iron or steel per cent dis	30
Flat head brass	30
Round head iron or steel	25
Round head brass	20
Brass and Silver capped	40
Japanned, list of Plain Screws	20
Coach, patent Gimlet point, list per 100	60
Lag, taper points	60
Bed	10
Machine, flat head, iron	55
round head, iron	50
Bench, iron	55&10
wood, beech, per doz $3	10
wood, hickory	20&10

Scales. Dis

Fairbanks'	25

Tank Iron.

3-16, ¼ and ⅝ inch thick	3 20

Tacks. Dis

Black	30—10
Tin'd	5C

Traps. Dis

New House	30
Peck, Stow & Co	50—10

Vises.

Solid box, Dis	40

Wrenches.

Coe's genuine	40 & 10
Coe's imitation wrought bar	60
Mechanics'	60 and 10

Wire.

Brass and Copper	dis 20
Bright & annealed, Nos. 0 @ 18	dis 50@52½
" " Nos. 19 @ 26	dis 60
" " Nos. 27 @ 36	dis 65
Coppered Nos. 0 @ 18,	dis 45
Galvanized, Nos. 0 @ 18, market list,	dis 40@45
Tinned, Nos. 0 @ 18,	dis 40@45
Cast steel	dis 40
Tinned Broom Wire, Nos. 18 @ 25	dis 55
Annealed Fence, Nos. 8 and 9	dis 55@52½
Annealed Grape, Nos. 10 to 14	dis 52½
Galvanized Telegraph, Nos. 7 to 9	℔ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11	℔ lb 8¼c
Galvanized Telegraph, No. 12	℔ lb 10½c
Fence staples	℔ lb 5½@5¾c
Fence Staples, galvanized,	℔ lb 7@7½c
Stubs Steel Wire	$7 00 to £
Barb Wire, painted	8½c
Barb Wire, galvanized	9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at	52c
Best Selected Iron Ropes from 3-16 in. at 8c. to 1¼ in. at	33c

Boiler Plates.

("Gaylord"--Standard Quality.)

C. No. 1	4 50
C. H. No. 1 Sheil	4 60
C. H. No. 1, 50,000	5 00
C. H. No. 1, 55,000	5 50
C. H. No. 1 Flange	6 00
Firebox	
T. S., 60,000 (as per)	6 00
T. S., 65,000 (act of)	
Homo. Steel, 70,000 (of Cong)	8 00

Heads, ½c ℔ lb. extra.

N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Rivets—" Albany."

⅛, ¼, 11-16, and ¾ in. diam. 5 50

Sheet and Tank Rivets. "Norway."

All sizes dis. 15

Nuts, Bolts, etc.

Square & Hex. Nuts	7 off list
Washers	6 off list
Machine Bolts	dis 55
Bolt Ends	dis 55
Boiler Patch Bolts	net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch	dis 37½
"National" Standard Gauge 11 inch to 15 inch	dis 25
"National" Special Locomotive Tubes	net list

Boiler Makers' Tools.

Doty's Power Shears	net list
" Hand Lever Shears	net list
" Power Punch	net list
" Hand Punch	net list
Steel Screw Punch	net list
Iron Screw Punch	net list
Boiler Plate Rolls	net list
Buffalo Forges & Blowers	dis 20
Watson's " "	net list
Spring Tube Expander	dis 15
Roller Tube Expander	net list
National Tube Cleaner	dis 20
Wire Flue Brushes	net list
Anvils—"Peter Wright"	12½ ℔ lb
Solid Box Vises	net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	2 70
4½ to 6 by ⅜ to 1 inch	2 80
1¾ to 6 by 1¼ to 1½ inch	3 15
1¼ & 1¾ by ⅜ to ¾	2 80
1 & 1¼ by ⅜ to ¾	2 90
⅝ ¾ and ⅞ by ⅜ to ¾	3 15

Round,

1 to 1⅞ inch	2 70
2 to 2¾	2 90
2¾ to 3¼	3 20
3¾ to 4	3 70
4¼ to 4½	4 20
4¾ to 5	4 40

Square.

1 to 1⅞ inch	2 70
2 to 2¾	2 90
2¾ to 3¼	3 20
3¾ to 4	3 70
¾ to ⅞	2 80

Heavy Band.

1½ to 6 by ¼ and 5-16 inch	2 90
1 to 1¾ by ¾ and 5-16 do	2 95
⅝ to ⅞ by ¼ and 5-16 do	3 00
⅝ to ⅞ by ¾ and 5-16 do	3 80

Half Oval and Half Round.

Wagon box iron ¾ and ⅞ 3 95
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 2¾ by ¼ to 3-16 3 25

Hoops.

1¼ to 2 , Nos 16 to 18	3 90
2¼ to 3½ do 13 to 15	3 80

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	4 50
No 25 to 26	4 30 offd. 4 50 asked
No 27	4 90
No 28	4 85

English Steel.

Best cast	℔ lb 15½c
Extra cast	16½c
Round machinery, cast	10c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16½c
Spring calking	7½@7¾c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel	12c
Crucible machinery	8c
Open-hearth ditto	5c
Hammer cast steel	9½c
Spring cast steel	7½c
Bessemer and open-hearth spring	5½c
Ditto plow	5½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7½@7½c
Tire	5
Sleigh shoes	5

Bessemer Steel Tire.

¾ to 1 by 3-32	4½ ℔ lb
¾ to 1 by ¼ to 5-32	4½ ℔ lb
¾ to 1 by 3-16 to ¼	4¾ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit	8
Axle steel for wagons	8
Frog points and plates	9
Frog size bars	7½
Pick, plain	10
Mattock, beveled	9
Table cutlery	8½
Trap spring steel	9
Pike and cant hook	8½
Coal and granite	8½

TINNER'S STOCK.

Tin Plate,

10x14 IC	charcoal	$6 25
do IX	do	8 25
12x12 IC	do	6 00
do IX	do	8 50
14x20 IC	do	6 50
do IX	do	$6 25@7 50
DC, 12½x17	do	6 00
DX 12½x17	do	8 00

For each additional X add 2 00

IC 10x14	coke	$5 75@5 50
IC 14x20	coke	$5 75@5 50
IC 12x12	do	5 00@5 75

Tin.

Banca	per lb.	28c
Straits	"	25c
English	"	25c
Spot Tin	"	25c

Solder.

½ and ¼	16½c
Extra	15½c
No. 1	13½c

Pat Planished Sheet Iron.

[A]	per lb 10½c
[B]	9½c

Nos	10	15	21	25
to	14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ½c extra

Sheet Iron.

Galvanized, No	10 to 20	℔ lb	8¼ a7¼
do	do 22 to 24		9 a8
do	do 25 to 26		10 a8½
do	do 27		10¼ a9
do	do 28		11¼ a9½

dis, 40

Russia Iron	12½@12c
American Cold Rolled	5@7½

Zinc.

Sheet, cask	7½@ 7¾
Sheet, open	8@ 8½

Tinners' Tools & Machines.

Machines (P. S. & W.)	list add 20
Tools (P. S. & W.)	add 6

LEAD.

American,	℔ lb	5¼c
Bar,	℔ lb	6¼c net
Pipe,	℔ lb	7½c dis 10 per ct
Sheet,	℔ lb	8c dis 10 per ct
Tin-lined pipe	℔ lb	15c dis 10 pr ct
Shot Drop 7c; Buck		8c
Chilled Shot		8c

COPPER.

Lake Ingot	18@18¼c
Baltimore	17¼ 17¾c
Arizona	18c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb	30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb.	32c
Brazier's Copper, 10 oz. and 12 oz. per sq. ft. per lb.	34c
Brazier's Copper lighter than 10 oz. per sq. ft. per lb.	36c
Circles less than 84 inches in diameter per lb.	33c
Circles 84 inches in diameter and over per lb.	30c
Segment and Pattern sheets per lb.	33c
Locomotive Fire Box sheets per lb.	30c
Sheathing Copper, over 12 oz per sq. ft. per lb.	28c
Bolt Copper per lb.	30c
Copper Bottoms per lb.	31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18	per sheet 6c

All other size sheets, 2½c per square foot. For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per lb	14
Heavy yellow Brass do	12
Light Brass per lb	12
Scrap Zinc per lb	6
Tea Lead per lb	3
Heavy Lead per lb	4

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos. not thinner than to No. 28, wider than 2 in. not wider than 14 inch	30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive	35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive	38c

¼c per lb. advance on each No. above Nos. 28 to 38, inclusive.

All Brass thinner than No. 8 is Platers' Brass at	53c

Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.

Platers' or Gold Metal In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb advance.	
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.	
Metal, in width ¼ in. to ½ in. thinner than No. 28, 5c per lb. advance.	
Metal ½ in. in width and less, 10c per lb. advance.	

Any of the above widths cut to particular lengths, add 7c per pound.

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, plain, 55 per cent; galvanized, 52½ per cent.

Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe—See Pipe Wrought.	
Enameled Pipe	dis 65
Artesian Well Casing	net list
Hydraulic Tubes	net list
Malleable Iron Fittings	net list
Cast Iron Fittings	dis. 55
Globe Valves	dis. 50
Angle Valves	dis. 45
Check Valves	dis. 45
Safety Valves	dis. 45
Eddy Gate Valves	dis. 20
Steam Cocks	dis. 45
Service Cocks	dis. 45
Ball Gauge Cocks (net per dozen)	$15
Compression Gauge Cocks	dis. 45
Miss. Gauge Cocks	dis. 45
Register Gauge Cocks (net per dozen)	$15
Cylinder Cocks	dis. 45
Air Cocks (net per dozen)	$2 75
Oil Cups	dis. 45
Steam Gauges	dis. 35
Water Gauges	dis. 45
Scotch Glass Tubes	dis. 60
Steam Whistles	dis. 45
Iron Body Globe Valves	dis. 55
Iron Body Safety Valves	dis. 55
Iron Body Steam Cocks	dis. 55
Pipe Tools	special
Globe, Angle and Check Valves (Powell's re-grinding)	dis. 45
Guarantee "Jet Pumps"	dis 40
Mack's Injectors	dis. 25

Babbitt Metal.

N. P. U.	℔ lb @9c
A. 28c., B. 25c., C. 15c.	

COAL,

WHOLESALE.

Wholesale f.o.b. vessel at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	2 85
Brier Hill	3 50@3 75
Pittsburgh	3 00
Salineville	2 50
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 15
Egg and grate	6 00

Hides and Leather.

Prime cured hides,	8@
Green hides	6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 75@2 00
Horse hides, dry	$2 00@2 25
Prime cured veal calf,	12½
Prime Deacon Skins, salted	60c
Pelts, wool on	32@34
Fresh slaughter sheep	30@$1.50
Fresh slaughter lambs	50@60
Green calf skins	13
Hemlock rough	23@24
Oak harness	35@39
Oak sole	37@40
Union harness	32@35

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	7 50
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	12
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS & AXLE GREASE

Pure Oils. packages included

Sperm, winter bleached per gal	@1 15
Elephant, winter bleached, per gal	@ 70
Whale, winter bleached per gal	60@ 65
Seal, winter bleached	80@ 85
Bank oil	48 @ 51
Straits	50 @ 53
"A" oil for tanner's use	35 @ 40
Lard oil extra W S	1 00@1 05
do No 1 do	80 @ 85
do No 2 do	67 @ 72
Tallow oil	65 @ 73
Neatsfoot oil pure	1 05
do No 1	90
Linseed oil, raw	60
Linseed oil boiled	63
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
Carbon oil Ohio legal test	9½@11½
West Virginia lubricating 28 deg	@ 29
Pure Mecca	55@ 60
Paraffine oil winter pressed gray 25	
do do do	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Distillers.

BLOCH, S. H. & E., Distillers, and wholesale dealers in Kentucky Whiskies. 66 Water St.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 838 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

ECLIPSE IRON WORKS manufacture Castings of all kinds. Cor. Center & Winslow Sts

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Grindstones.

OHIO GRINDSTONE CO. manufacturers of and dealers in Grindstones. 127 Superior st.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 86 South Water Street.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

ALLIANCE INDUSTRIAL WORKS, E. Fawcett & Son, Proprietors, manufacturers of portable and stationary steam engines and circular saw mills.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting, &c.

Business Directory.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

COLUMBUS MACHINE CO. manfrs. of Blowing, Stationary and Portable Engines, Brass and Iron Castings. West End Nat. Road Bridge.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

RAGAN W. H. & CO., manfrs of Doors, Sash and Blinds, Mouldings, Casings, Balusters, Newels, Hand-railing, and Builders' Mill Work of every description. Cor. West Broad & Center.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Garrettsville, O.

UDALL & NILES Foundry and Machine Shop. General repairing and jobbing on short notice

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

TREMONT HOUSE, Jas. M. Clark, proprietor. Terms $1.50 per day. Good sample room for Commercial Travellers.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

WOOLWORTH, JAMES, manfr. of Axe, Pick, Sledge and Auger Handles, Hickory Whip Stocks, &c. Established in 1855.

FULTON MACHINE WORKS & FOUNDRY, Barney & Kirby, proprietors, manfrs. of Stationary and Portable Engines and Boilers, Rolling Mill Machinery, Circular Saw Mills, etc.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

THE PUREST AND BEST BONE DUST. Send for Circular. S H. Morgan & Co.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Business Directory.

Erie, Pa.

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, shafts, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and sron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42¾ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

KELLY, PETER, Boiler Maker, Mill street, cor. Furnace. Sheet iron work made to order.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

KINGSBURY, G. J., Cracker and Oven Machinery Works, Shawmut Building, Mill St.

WISEMAN, Albine, manufacturer of all kinds of Shoemakers' Tools. 117 North Water St.

ULSCHT & LINN mfrs of Wood Lathes, Engraving Machinery, &c 131 N. Water street

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Ulscht, Linn & Co. 131 N. Water

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I. J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

THE BUFFALO NUT AND BOLT CO. [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Louisville, Ky,

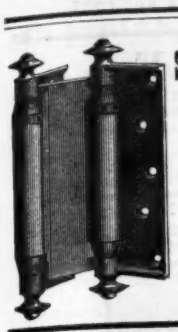
HAIGHT, ROBERT. Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

H. C. CHANDLER
Engraver on Wood
Cor. Circle & Market Sts.
JOURNAL BUILDING INDIANAPOLIS, IND.

CLEVELAND
ELECTROTYPE
FOUNDRY
55 FRANKFORT STREET 55
CLEVELAND, O.



THE COMPOUND
SPIRAL SPRING HINGE,
has the lightest and
Most Elastic Movement
Combined with
THE GREAEST POWER.
Manufactured by
LORENZO BOMMER,
84 Pearl Street, cor. Front,
BROOKLYN N.Y.

Smith & Curtiss,

JOBBERS OF

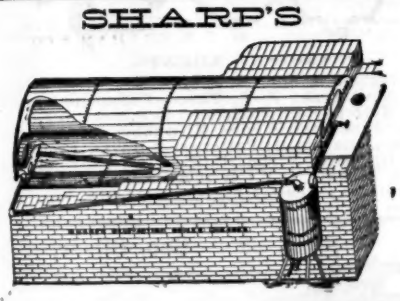
TEAS,

COFFEES AND SPICES

ALSO PROPRIETORS OF THE
CLEVELAND
Coffee and Spice Mills,
107 & 109 Bank Street,
Cleveland, O.

JUDSON'S PATENTED
SECTIONAL
Assay Furnaces
AND APPLIANCES.
Model Furnace for 1881,
All steel, light and durable, with Revolving Grate, etc. Also
Judson's Practical Stoking Attachment
Guaranteed to feed coal, coke or charcoal without choking the draft.
Manufactured only by the patentee,
W. E. JUDSON,
Cleveland, O

SHARP'S



SELF-ACTING BOILER CLEANER.

Patented November 23, 1880.
THOS. SHARP & CO.
SALEM, OHIO.
☞ Send for Circular and Price List.
[Mention this paper.]

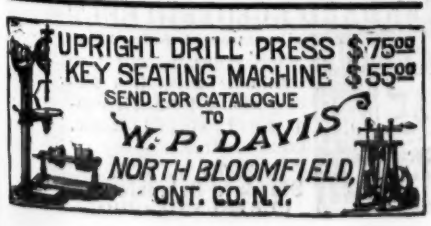
Portable Mulay Saw Mill,

With improvements recently made is unequaled as a neighborhood mill. It can be run by either steam or water power, and is especially adapted to the engines used for threshing.

It may be operated by either two or three men, and will cut as much lumber in proportion to the power and number of hands employed as mills of larger capacity.

It makes smooth and even lumber, leaves no stubshot, and will cut any sized log up to four feet in diameter. It may be transported from one locality to another and re-erected ready for sawing in from two to three days, and can be made profitable in localities where there is not sufficient timber to justify the erection of a large mill. Send for descriptive circular, price, etc., to
CHANDLER & TAYLOR, Indianapolis, Indiana

P.S.—We are also building a very superior Pony Circular Saw Mill suited to light power and medium sized logs.



C. S. BARRETT, President.
P. ARNOLD, Superintendent.

Dover Fire Brick Co.,

MANUFACTURERS OF

Fire Brick of all Shapes and Sizes,

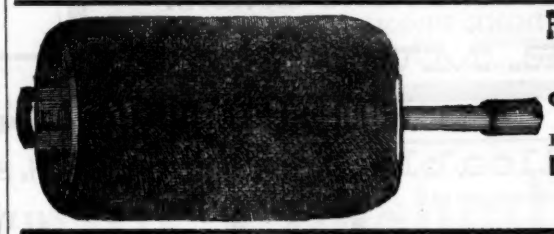
— AND —

Shippers of Fine Ground Fire Clay.

Office--101½ Water Street, Cleveland.

Practical Lithographer.

CHAS. F. SCHMIDT,
PRACTICAL
Lithographer, Engraver
AND PRINTER,
Room 12 Bratenahl's Block, cor. Superior and South Water Streets, Cleveland, O.
Correspondence solicited from Manufacturers.



Patent Steel Tube and Flue Brush.
Best in the Market.
Made any size required.
Combines the properties of a Scraper and Brush.
Full stock always on hand.
L. B. Flanders Machine Works
1025 Hamilton street,
PHILADELPHIA, PA.

JOSEPH M. DOWNING.

UNION TUBE WORKS, NEWCASTLE, PA.

MANUFACTURER OF

LAP WELDED BOILER TUBES

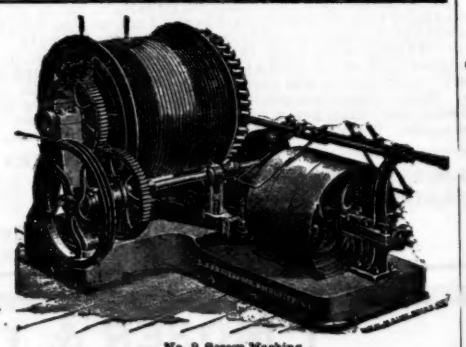
FROM BEST AMERICAN

Charcoal Hammered Iron.

Freight and Passenger

Elevators.

L. S. GRAVES & SON,
Cor. Center and Frank Streets,
ROCHESTER, N. Y.



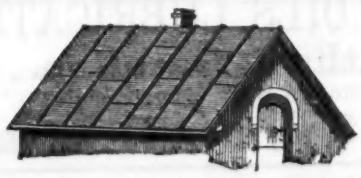
Send for our Catalogue.
No. 3 Screw Machine.

Truck Hubs.

Black Birch Carriage, Wagon and
TRUCK HUBS.
Sizes from 3½x6½ to 18x22.
R. M. WHITNEY,
OLEAN, Cattaragus Co., N. Y.

CROWL'S PATENT IRON

ROOF

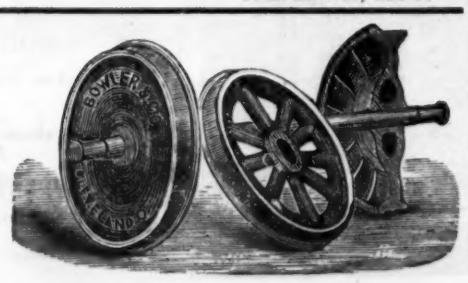


ING.

For Steep or Flat Roofs.--No More Noise or Leaking.
Tin and Slate also Furnished.
AGENTS WANTED IN EVERY COUNTY.
CAMBRIDGE ROOFING CO., CAMBRIDGE, OHIO.
J. E. ANNIS, SEC'Y.

Cleveland Foundry.

CASTINGS
For Machinery and Rolling Mills.
Car Wheels
all sizes and kinds, with and without Axles.
Chilled Faced R. R. Frogs.
STREET RAILROAD TURNOUT
Nos. 9, 11, and 13 Winter Street.
BOWLER & CO.



G. M. HEARD & CO.

Gold, Silver & Nickel Platers

109 Ontario Street.
CLEVELAND, O.

B. F. Roberts,

BOILER MAKER,

And Sheet Iron Worker.
BRIDGE STREET, SPRINGFIELD, OHIO
Special attention paid to taking out and Piecing Portable Flues.
☞ Orders by mail to B. F. Roberts, Springfield, Ohio, promptly attended to.

E. F. ENSIGN,
JOBBER OF

Agricultural Implements,

WAGONS, FERTILIZERS, SEEDS, &C.
The Empire Grain and Fertilizer Drill and Twine Binding Harvesters Specialties.
134 ST CLAIR STREET, CLEVELAND, O

Springfield Brass Foundry.
Pattern and Model Work a Specialty.
Castings done in White Metal, Brass, Zinc, Type Metal, Pig Lead, Pig Tin, Bar Lead, Bar Tin, Antimony, Copper, Spelter, &c., &c.
Cash paid for Old Brass and Copper
McLAUGHLIN & SHILLING.
68 South Limestone Street,
SPRINGFIELD, O.

PURE PREMIUM BONE.

The tried and never failing Fertilizer in all grains and grass crops. It has proved its value as such by years of actual use all over the world. Circulars and Price List free. Address all letters pertaining to the purchase of Premium Bone, or the sale of bones, to **Excelsior Fertilizer Works,** Salem, Columbiana County Ohio.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

EAST BOUND TRAINS.

	Arrive.	Depart.
No. 20 Limited Express	*1:35 A.M	*1.50 A.M
No. 6 Atlantic Express	*7:05	*7.30
No. 10 Buffalo Accom	11:00	11.15
No. 8 C. & St. L. Exp	*2:25 P.M	*2.55 P.M
No. 4 Special N. Y. Exp	10:10	10.35
No. 2 San. Div. Accom.	10:12	
No. 12 Conneaut Accom.		4.50
Nottingham Accommodation (Sundays only)	10.05 A.M / 4.45 P.M	9.00 A.M / 2.15 P.M
No. 18 Elyria Accom.	8.50 A.M	

WEST BOUND TRAINS.

	Arrive.	Depart.
No. 13 Mich. Accom.		6.40 A.M
No. 1 Special Chicago Ex.	*6.35 A.M	7.00
No. 3 Toledo Express	1.25 P.M	3.30 P.M
No. 21 St. Louis Express	*1.40	*2.05
No. 5 Pacific Express	*7.05	*7.35
No. 11 Conneaut Accom.	8.40 A.M	
No. 19 Pt. Clinton Accom.		5.00
No. 7 Michigan Exp.	*2.50 A.M	*3.05 A.M
No. 17 N.Y. & Chi. Ex.	11.43 P.M	11.53 P.M

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'pons Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev. Accom	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No. 4 Special Cin. & New York Exp.	3 20
No. 10 Wheeling & Cleveland Exp.	8 25
No. 6 Indianapolis & Columbus Exp.	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 15
No. 3 St. Louis & Cincinnati Ex.	†2 00 P.M
No. 5 Night Express,	*7 25
No. 7 C.T.V. & W. & Col. Accom.	4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp.	8 25 P.M
No. 2 Uhrichsville Accom	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp.	7 15 A.M
No. 3 Uhrichsville Accom	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo.	10 55 A.M
No. 3 New York Express,	*7 00 P.M
No. 1 New York Express,	6 50 A.M
No. 3 Pittsburgh Express,	*7 00 P.M
No. 5 Pittsburgh Express,	3 10
New York Express	3 10
No. 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No. 4 Youngstown Local,	11 15
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

DEPARTURES.	ARRIVE.
Mail 8 00 A.M	1 15 P.M
Express 1 50 P.M	7 25
Alliance Accommodation 3 45	10 10 A.M
Ravenna Accommodation 5 30	8 35
Night Express †11 40 P.M	6 30 A.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.	DEPARTURES.
No. 2 Accom. 10 15 A.M	No. 1 Mail 8 15 A.M
No. 6 Express 1 35 P.M	No. 3 Accom. 2 20 P.M
No. 4 Mail 6 30 P.M	No. 5 Exp. 6 05

Trains leave from Depot foot of South Water Street.

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Connotton Valley Railway.

Arrive.	Depart.
No. 1 10 05 A.M	No. 4 4 00 P.M
No. 3 7 15 P.M	No. 2 8 10 A.M

All trains arrive and leave depot corner Commercial and Fifth Streets.

NEW OTTO SILENT GAS ENGINE.

Working without Boiler, Steam, Coal, Ashes or Attendance.

Started instantly by a Match, it gives full power immediately.

When stopped all expense ceases.

No explosions; no fires nor cinders; no gauges; no pumps; no engineer or other attendant while running.

Unsurpassed in every respect for hoisting in warehouses, printing, ventilating, running small shops, &c., 2, 4 and 7 H.P. and upwards. Built by

Schleicher, Schumm & Co., PHILADELPHIA.

ALBERT FISHER, Agent for Cleveland. 48 Merwin Street, Cleveland, O.

WEST POINT BOILER WORKS.

ESTABLISHED 1835.

Removed from 13 Water to Corner 23d and Smallman Streets, PITTSBURGH, PA.

FIRST PREMIUM STEAM

BOILERS,

Stills, Tanks and Sheet Iron Work

of all descriptions made to order on short notice. Have on hand a large stock

New and Good Second Hand Boilers.

REPAIRING DONE PROMPTLY.

R. MUNROE.

Dayton Malleable Iron Co.,

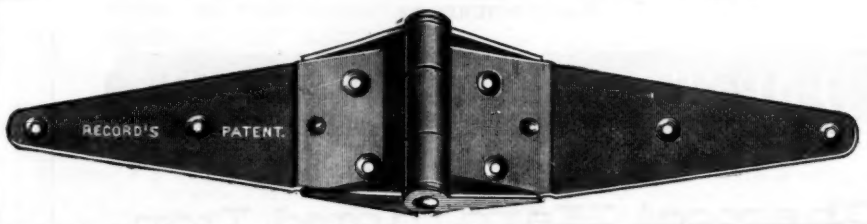
Manufacturers of

Air Furnace Iron.

A full line of Carriage and Plow Hardware kept in stock.

Catalogues for the Trade.

Record's Patent Hinge.



THE MAIN PART of this Hinge is of the same style as the ordinary heavy strap. The joint is strengthened by FLANGED SUPPORTS, made of extra quality of iron, spanning the entire width of each leaf, firmly riveted to the back of the hinge. The pintle of the hinge passes through the ear of the flange, thus adding greatly to its strength. Also, by the additional thickness of iron, greatly STIFFENING THE HINGE where most liable to bend, and secure against breaking where the greatest part of the STRAIN COMES. As the straps of the hinge are bent down, forming an offset for the reception of the supports, the hinge is smooth or flat on the back, same as the ordinary hinge. These hinges are neat in appearance, and owing to their great strength admitting of smaller sizes being used than heretofore, renders them the most economical, as well as the most desirable hinges made. They are applied the same as ordinary hinges.

PRICES PER DOZEN PAIRS.

5-inch, $2.00. 6-inch, $2.80. 8-inch, $4.40. 10-inch, $6.60. 12-inch, $9.40.

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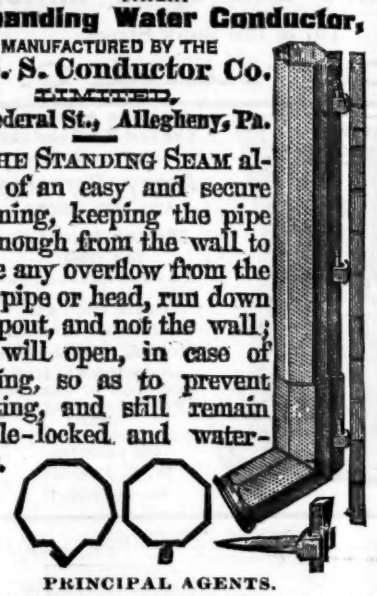

THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

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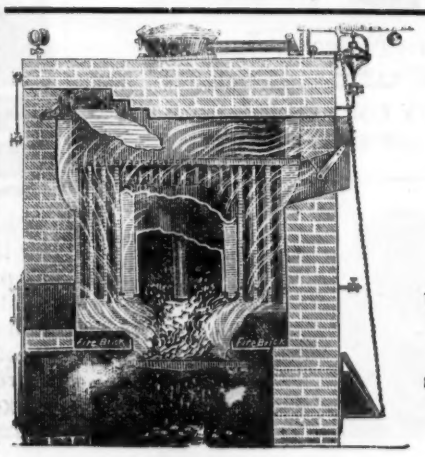

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For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg, 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:38 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 8:25 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m; via Sharon and Sharpsville to Meadville 7:40 p.m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:30 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 10:00 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 1:08 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:55 a.m., and 1:13 p.m. and 4:20 p.m.

11:15 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 2:10 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 3:10, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

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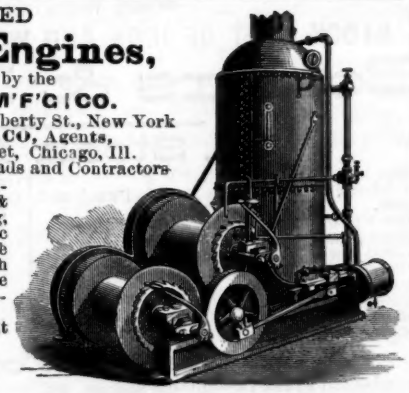

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Down-draft Base Heating Furnaces and School Room Ventilating Stoves,

For the heating of Dwellings, Churches, School Houses and Public Buildings, call the attention of the Trade and the public to the following PRACTICAL POINTS:

Durability, Economy in fuel, **Heating Capacity,** (being a Base Heater), **Patent Dust Flues, Patent Removable Grate and Stand, &c.** We GUARANTEE our Furnaces to be **free of Dust, Smoke or Gases** in Warm Air Conductors, thus removing the great objection to Furnaces.

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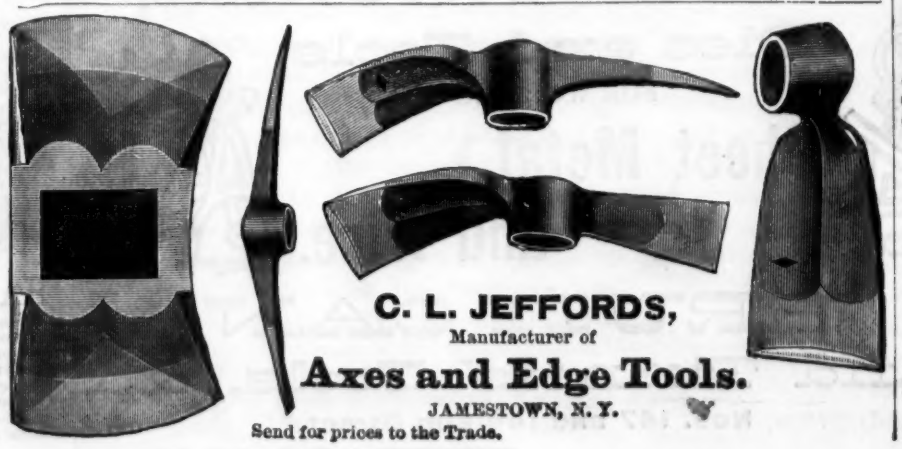

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Send for prices to the Trade.

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Trains leave and arrive daily, (Sunday excepted,) at the points named below, as follows:

MAIN LINE—GOING WEST.

	Western Expr'ss.	Mail Expr'ss.	Fast Line.	Accom.
Leave				
Pittsburgh	7 30 a.m.	2 00 pm	11 50 pm	.....
Allegheny	7 40	2 10	12 00 am	.....
Arrive				
Rochester	8 23	3 00	12 50	.....
Beaver	8 30	3 05	12 55	.....
E. Liverpool.	9 08	3 37	1 37	.....
Wellsville	9 18	3 47	1 50	.....
Salineville	9 57	4 24	2 33	.....
Bayard	10 34	5 02	3 21	.....
Alliance	11 05	5 25	3 55 am	.....
Leave				
Alliance	11 10	5 25	4 05	7 30 am
Arrive				
Ravenna	11 48	5 59	4 47	8 15
Hudson	12 18 p.m.	6 23	5 15	8 50
Cleveland	1 15 p.m.	7 25 pm	6 30 am	10 10 am

Accommodation train leaves Ravenna at 6.45 a.m; arrives Hudson 7.15 a.m., Cleveland 8.35 a.m.

☞ Mail Express runs through Parlor Car, Fast Line and Western Express through Sleeping Car, Pittsburgh to Cleveland.

NOTE.—Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE—GOING EAST.

	Pittsb'g Expr'ss.	Fast Line.	Day Expr'ss.	Accom.
Leave				
Cleveland	8 00 am	1 50 pm	11 40 pm	3 45 pm
Arrive				
Hudson	9 05	2 50	12 50 am	4 55
Ravenna	9 37	3 17	1 18	5 30
Alliance	10 20	3 53	2 05	6 20 pm
Bayard	10 54	4 16	2 49	.....
Salineville	11 40	4 51	3 40	.....
Wellsville	12 20 pm	5 20	4 35	.....
E. Liverpool.	12 54	5 44	4 57	.....
Beaver	1 30	6 17	5 47	.....
Rochester	1 35	6 22	5 53	.....
Allegheny	2 30	7 05	6 45 am	.....
Pittsburgh	2 40	7 15	6 55	.....
Harrisburg.	.....	3 50 am	4 00 pm	.....
Baltimore	.....	7 30	7 20	.....
Washington	.....	9 02	8 47	.....
Philadelphia	.....	7 20	7 35	.....
New York	.....	10 25	10 35	.....
Boston,	.....	8 00 pm	.....	.....

Accommodation train leaves Cleveland Union Depot at 5.30 p.m., arrives Hudson 6.50 p.m., Ravenna 7 20 p.m.

All trains connect at Yellow Creek for Wheeling and Bellaire.

☞ Pittsburgh Express runs a Parlor Car Cleveland to Pittsburgh. Fast line runs Through Sleeper to New York. Day Express runs Through Sleeper to Pittsburgh.

TUSCARAWAS BRANCH.

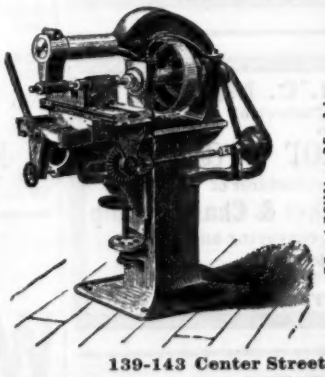
Trains leave Bayard at 11.00 a.m. and 5.10 p.m. arrive Minerva 11.08 p.m. and 5 20 p.m : arrive Dover 12.18 p.m. and 7.15 p.m., New Philadelphia 12.30 p.m. and 7.30 p m. Returning leave New Philadelphia at 7.00 a. m. and 2.05 p. m., Dover at 7.30 a.m. and 2.15 p m., Minerva at 9 45 a.m. and 3.23 p. m., Bayard at 10.00 a.m and 3.33 p.m.

All trains daily except Sunday.

D. W. CALDWELL, General Manager. E. A. FORD, Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

E. E. GARVIN & CO.

Manufacturers of



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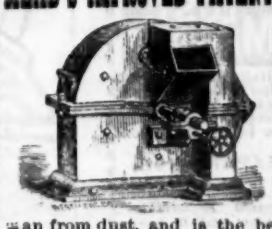

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Gentlemen' Clothes Cleaned, Dyed and Repaired, a Specialty.
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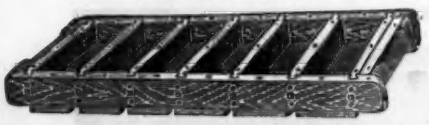
Elevator Bucket & Chain Belting
For elevating, conveying and driving purposes.
From 64 to 68 Columbia Street,
BUFFALO, N. Y.

D. J. C. ARNOLD,
Manufacturer of



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All goods first class. Orders and correspondence solicited. NEW LONDON, O.

Seminal Weakness, Pimples and Impure Blood, loss of Energy and Strength, aversion to Society, Pains in Back and Loins, Impaired Memory, Palpitation, loss of Vitality, Bladder and Urinary troubles, distressing Night Emissions and the vital drain arising from Youthful Indiscretion, which, if neglected, terminate in Impotence and Premature Decay, treated on results of
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effecting cures *in as many days* as requires weeks under ordinary nauseating remedies.
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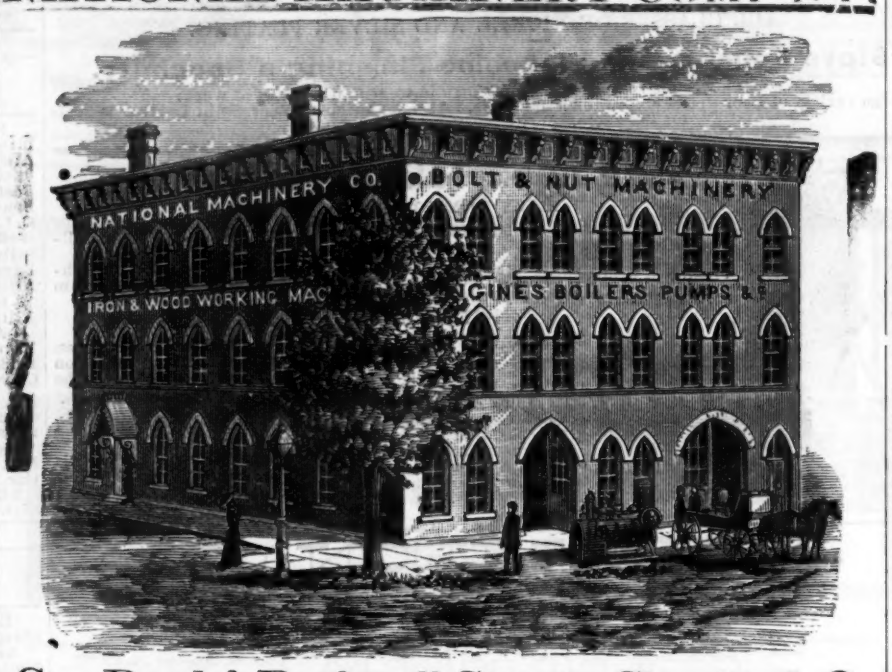

Cor. Bond & Rockwell Streets, Cleveland, O.
SALESROOM—384 SUPERIOR STREET, CORNER BOND.
Manufacturers of
"National" Bolt and Nut Machinery,
Agents and Stock kept of Pratt & Whitney's Screw Cutting Tools, Taps, Dies, &c. Agents for J. A. White's, Levi Houston's and J. S. Graham & Co.'s Wood Working Machinery.
STOCK KEPT OF IRON AND WOOD WORKING MACHINERY,
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In Stock for Sale:

One Thorn and DeHaven Drill.
One No. 7 Long & Allstatter's Double Punch and Shears,
One 4-horse power Engine and Boiler.
One 6-horse power Engine and Boiler
One 7-horse power Engine and Boiler.
One 10-horse power Engine and Boiler.
One 5-horse power Engine.
One 8-horse power Engine.
One 12-horse power Engine.
One 25-horse power Engine. New.
One 30-horse power Engine. New.
One portable Engine and Boiler 7½x10, mounted on wheels. All in complete order. Used only about three years.
One 30-inch under run French burr mill. All complete. Send for description and price.
One 35-horse power Engine. And several others all in stock.
New and Second Hand Belting, Pulleys, 2 Water Motors, &c., &c.

List of Wood Tools.

One second-hand Frank two-spindle Shaper, $65.
One " " wood frame 2-spindle Shaper, $85
One " " " " Cutting-off Saw, $30
One " " " " Spoke and Handle Lathe $125
One " " 22 inch Greenwood Heading Planer, $125
One " " Ellis Blind Slat Tenoner.
One " " 24-inch Ball & Co., Planer and Matcher.
One " " Power Rod and Dowell machine
One " " Fay & Co. No. 1 Railway Cut-off Saw.
Two " " Sandpaper Drums.
One second-hand Dimension Planer, 24-inches, with Feed attachment.
One " " wood frame swing Cut-off Saw and Table.
One " " Slotting machine.
One " " Thorn & Dehaven Drill.
Two " " Saw Tables.
One wood frame 6 inch Sticker.
Large lot second-hand Trenton Vises.
Large lot second-hand Anvils.
One Fay & Co. Agricultural Morticer, with boring attachment.
One Fay & Co. iron frame Tenoning machine, double heads.

Having moved our Salesroom to the large room previously occupied by the Wilson Sewing Machine Company, we are able to carry a very fine line of Wood Working Machinery and other Tools.

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CLEVELAND WINDOW GLASS CO.
For Doors, Sash, Blinds and Windows,
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NIAGARA STAMPING AND TOOL CO.,
Manufacturers of
Power and Foot Presses,
Dies and Tools
FOR WORKING
Sheet Metal and Wire.

FRUIT CAN
And Tinners' Tools, &c.
Nos. 147 and 149 Elm Street,
BUFFALO, N. Y.

Cleveland, Akron and Columbus RAILROAD.

Trains leave and arrive daily (Sundays excepted) at the points named below.

GOING SOUTH.

STATIONS. February 20, '82.	Miles	Mail and Expr 2	Thro' Pass'gr 4	Accom 6	Accom 8
		A.M.	P.M.	P.M.	
Cleveland		8.00	1.50	3.45	.....
Hudson (1)	0	9.15	3.00	5.05	.....
Cuyahoga Falls	8	9.32	3.18	5.23	.....
Akron (2)	14	9.47	3.33	5.36 / 5.50	.....
Clinton	27	10.17	4.04	6.23	.....
Warwick	28	10.23	4.10	6.31	.....
Marshallville	33	10.35	4.23	6.45	.....
Orrville (4)	39	10.51	4.43	7.03	.....
Fredricksburg	52	11.22	5.16	7.37	.....
Holmesville	56	11.34	5.28	7.52	A.M.
Millersburg	62	11.48	5.41	8.05	5.40
		P.M.			
Killbuck	68	12.02	5.55	.....	5.54
Black Creek	74	12.16	6.09	.....	6.08
Gann	82	12.41	6.35	.....	6.33 / 6.53
Danville	86	12.55	6.49	.....	7.07
Howard	91	1.05	6.59	.....	7.18
Gambier	95	1.15	7.11	.....	7.29
Mt. Vernon (5)	100	1.30	7.27	.....	7.43
Mt. Liberty	109	1.58	7.47	.....	7.59
Centerburg (6)	114	2.08	7.57	.....	8.19
Condit	120	2.22	8.11	.....	8.24
Sunbury	124	2.31	8.20	.....	8.35
Galena	126	2.36	8.26	.....	8.41
Westerville	133	2.51	8.42	.....	8.58
Columbus (7)	145	3.15	9.06	.....	9.23

GOING NORTH.

STATIONS. February 20, '82.		Thro' Pass'gr 1	Mail Expr 3	Accom 5	Accom 7
		A.M.	P.M.		P.M.
Columbus	0	6.00	12.15	.....	5.05
Westerville	12	6.25	12.41	.....	5.32
Galena	19	6.41	12.57	.....	5.49
Sunbury	21	6.47	1.03	.....	5.55
Condit	25	6.56	1.13	.....	6.06
Centerburg	31	7.10	1.27	.....	6.20
Mt. Liberty	36	7.20	1.38	.....	6.32
Mt. Vernon	45	7.43	2.02	.....	6.59
Gambier	50	7.55	2.15	.....	7.11
Howard	54	8.05	2.25	.....	7.23
Danville	59	8.15	2.36	.....	7.34
Gann	63	8.30	2.50	.....	7.49
Black Creek	71	8.56	3.15	.....	8.15
Killbuck	77	9.10	3.28	.....	8.29
				A.M.	
Millersburg	83	9.26	3.43	5.50	8.42
Holmesville	89	9.37	3.55	6.05	.....
Fredricksburg	93	9.49	4.06	6.18	.....
Orrville	106	10.23	4.43	6.50 / 7.10	.....
Marshallville	112	10.35	4.55	7.23	.....
Warwick	117	10.46	5.09	7.37	.....
Clinton	118	10.52	5.15	7.46	.....
Akron	131	11.28	5.47	8.22	.....
Cuyahoga Falls	137	11.41	6.00	8.35	.....
Hudson	145	12.00 M	6.18	8.55	.....
Cleveland		1.15 P M	7.25	10.10	.....

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

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